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IRON AGE

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This Week in The IRON AGE

Vol. 152, No. 22 November 25, 1943

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News and Markets

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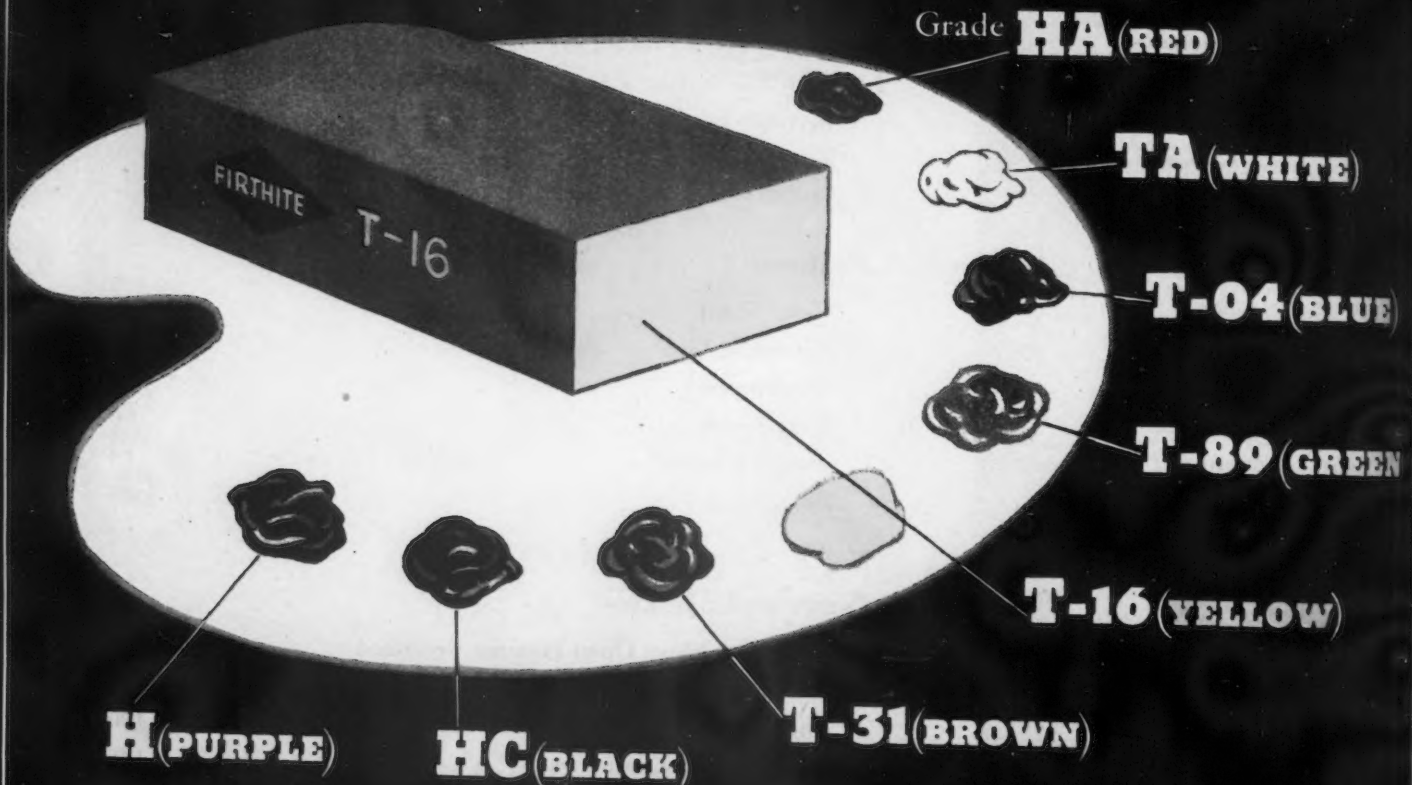
Firthite "Color-Branding" GETS A BIG HAND FROM COAST TO COAST



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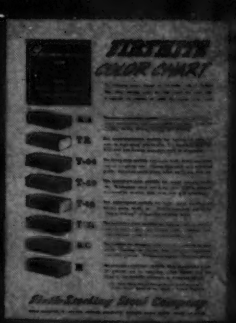
Send for **COLOR CHART**

Handy guide to selection of Firthite



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The IRON AGE

ESTABLISHED 1855

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Nov. 25, 1943

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Splitting Up the Elephants

SENATOR Patrick J. McCarran, of Nevada, has made a proposal which, we understand is being taken seriously, not only by his home constituents but also by a number of his fellow legislators. It is that somebody, preferably private enterprise, immediately start to build big steel producing plants in every state of the union, the capacity of these new plants to be equivalent to our total present steel producing capacity.

Naturally, since normal demands for steel for peacetime operations have never been able to utilize full capacity of existing facilities—prewar utilization over a 10-year period has been about 60 per cent—this means splitting up or abolishing present units. And this reminds me of a story.

Once upon a time, long before the first man introduced himself to the first lady of that day with the statement: "Madame, I'm Adam," the current ruler of the animal kingdom, who was an advanced thinker, got a bright idea. "There is too much variation in size between the various members of my kingdom," said he. "Take elephants and ants. The latter are at a great disadvantage because elephants can step on them and put them out of business without even knowing it. We should even things up by making elephants smaller and the ants bigger, thus giving everyone a fair chance."

Now it so happened that the differences in size between elephants and ants and between other members of the animal kingdom were not matters of chance or choice, but functional differences that were dictated by natural laws. However, what chance has a natural law when it bumps up against the opinions and desires of an unnatural law maker? So the ruler proceeded to pass a law.

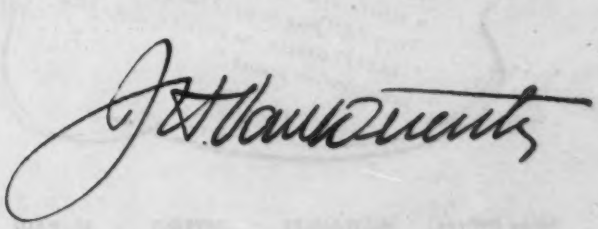
He waited several months to see what would happen, but of course nothing did. Ants continued to be small and elephants large. So he called a meeting of his wise ones and councilors and laid the problem before them.

Said the wise ones: "Oh King, we do not know how to make ants large, but we do know how to make elephants small. Let's cut them into little pieces so that each big elephant will become a lot of small ones."

So the chief veterinarian was called and instructed to carve up the elephants. But alas, after he had done so it was found that the dismembered parts were no longer elephants but unrecognizable pieces of flesh that had no more life in them and had to be buried quickly to keep the atmosphere from being polluted.

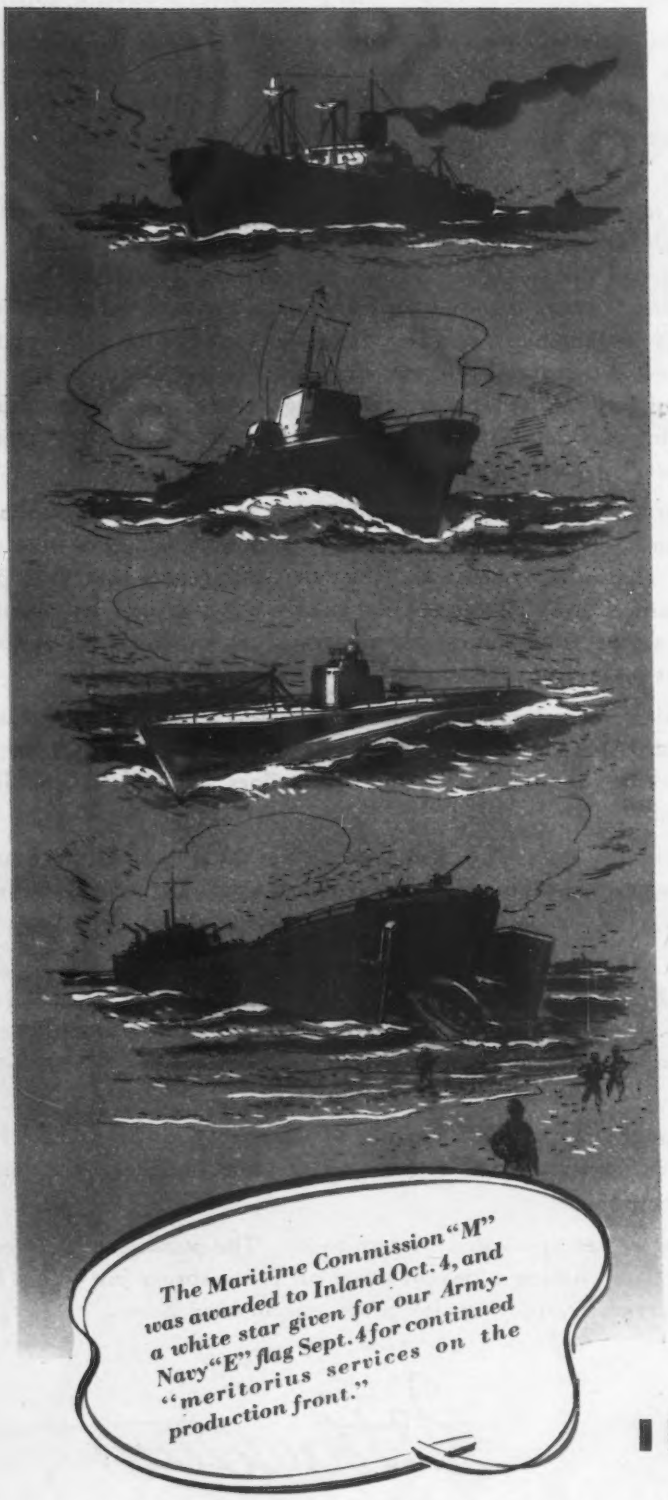
This taught the would-be maker of unnatural law a lesson. He learned that some animals have to be big to fulfill their intended functions and some small.

Perhaps we can apply that wisdom today. The public might indeed be well served by having a peanut stand on every corner but would be indeed ill served by applying this procedure to steel plants.



Throughout the Seven Seas

YOU'LL FIND INLAND PLATES



The Maritime Commission "M" was awarded to Inland Oct. 4, and a white star given for our Army-Navy "E" flag Sept. 4 for continued "meritorius services on the production front."

At every point of the compass . . .
North, east, south, or west . . .
Throughout the Seven Seas . . .
You'll find Inland plates
In Victory ships, escort vessels,
And in landing barges.

But,
You'll find more
Because many cargo ships
Will be delivering
Combat tanks, jeeps, bombs,
Gun carriages, etc.
Made from steel
Rolled by Inland at Indiana Harbor.

Today,
As during all the war months,
Inland men and women
Are keyed to the job
Of producing quality steel
To help bring Victory . . .
To keep America free.

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The IRON AGE
NOV., 25, 1943

NEWS FRONT

• Either Germany is very close to defeat or some serious American production errors are in prospect. Half-hearted official remonstrations against complacency in no way offset widespread repetition of the reports of imminent German collapse such as the one said to have been brought back by a very high WPB official who was just flown in and out of Sweden by Mosquito bomber.

• War agencies and individual manufacturers are in the process of frantically squeezing out material pipelines—reflected immediately in open hearths going out of production last week.

• All of a sudden, agencies, companies and individuals seem imbued with the desire to unload stocks, to clean slates, in preparation for I (investigation) - Day.

• Key personnel continues to leave WPB, and after year's end it likely will be only a shadow of its former self.

• And: From one end of Washington to the other, from top to bottom, the fight for post-war planning power is the only subject now given serious attention.

• Indicative of severity of recent cut-backs is bullet-core steel, scheduled to step up to 40,000 tons monthly by this December. Now, contracts have been cancelled, and December output will be zero.

• Alloy steel output has dropped to the lowest level since June, 1943. Open hearth demands have dropped under capacity, with some marginal units going off, and considerable addition slackening in immediate prospect.

• The Maritime Commission, using over one-third the country's steel output and with about nine month's steel supply in yards, has so far started no cut-backs. But, if started, the effect on steel production will be quick and dramatic.

• Meanwhile: Additional steel producing units are continuing to be built, while at the same time recently completed DPC units are idle.

• Flying instruments which a year ago were holding up aircraft assemblies are now in such good position that production is being cut back. In some instances small plants converted from other products are doing a better job than large instrument makers, although development is naturally still concentrated in the larger plants.

• Promising results are obtained with bench-type machines in the blanking and forming of small parts, with many economies of tool equipment previously thought possible only with large hydraulic presses.

• Russia's position as a heavy industrial goods customer immediately after the war is indicated by the fact that 50 per cent of coal and coke, 70 per cent of iron ore, 60 per cent of iron and steel, and 40 to 50 per cent of machine building production capacity of the U.S.S.R. has been destroyed.

• Half Willow Run's aircraft manufacturing has been subcontracted, reducing former manpower requirements of 100,000 workers to 50,000 or 65,000.

• Scrap brokers and dealers are wondering (and worrying) over the probable effect on the trade of wartime establishment of 75,000 salvage managers in the nation's plants, and industry's increased savvy and interest in scrap.

• Though total imports of raw materials in the fiscal year ended July 1 amounted to $2,750,000,000, the 146 Government purchasing programs accounted for only $1,300,000,000. Of this, all but $117,000,000 was brought in through private importers.

• The plight of the small scrap dealer in those areas carrying a shipping point price at or near the $14 OPA floor (South, Southwest and New England) is becoming increasingly desperate, and shipments from those points are drying up at an alarming rate.

• Important changes in scrap price policy and consolidation of scattered government administration over scrap metal are presaged by a White House report aimed at bringing back the peddler and small dealer.

• A new stimulant to employment of women is being tried on the West Coast. Each company's maximum October employment has been made an over-all employment ceiling, with a further male employment ceiling of a number of male employees in October, less 10 per cent.

Drawing 105 mm.

Steel Cartridge Cases

. . . In a series of two articles the manufacture of 105 mm. steel cartridge cases and 105 mm. high explosive shell for use in those cases by Mullins Mfg. Corp. will be described. The following deals with the 105 mm. steel cases.

By THOMAS E. LLOYD
Cleveland Editor, THE IRON AGE

NORMALLY a producer of metal stampings used in the fabrication of a wide range of consumer products, Mullins Mfg. Corp.'s Youngstown Pressed Steel Division, at Warren, Ohio, was among the first plants to feel the tightening grasp of government limitation orders on the manufacture of civilian items. With what seemed to be the ease of a quick-change artist, but in reality involved serious thought, planning, and engineering, to say nothing of considerable expense, the production was quickly shifted to the manufacture of war materials including a variety of stamped metal items, brass cartridge cases, and other products required by the American and United Nations armed forces.

Two of the most interesting conversions made by Mullins were to the manufacture of steel cartridge cases for 105 mm. shell and high explosive shell for cases of this size. Mullins had previously been making 105 mm. brass cartridge cases, but on Jan. 1, 1943, a line for production of steel cases was started. At present, work

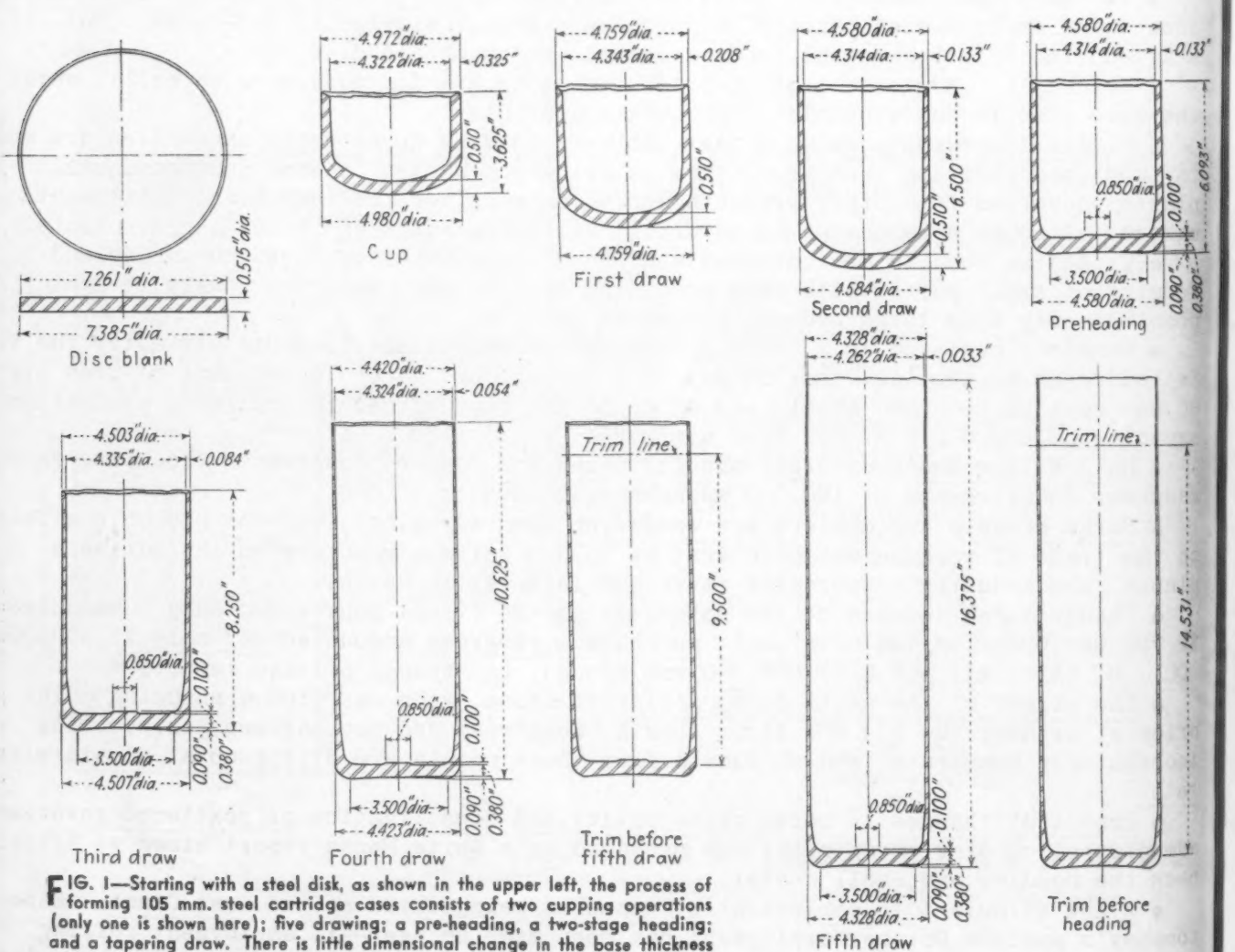


FIG. 1—Starting with a steel disk, as shown in the upper left, the process of forming 105 mm. steel cartridge cases consists of two cupping operations (only one is shown here); five drawing; a pre-heading, a two-stage heading; and a tapering draw. There is little dimensional change in the base thickness of metal, the walls being formed entirely by ironing out the metal above the base ring.

is progressing at maximum speed on two steel shell case lines, the second going into operation on March 8, 1943. In the short space of about eight months, this company rose to the position of the foremost manufacturer of 105 mm. steel cartridge cases in the country, supplying upwards of 90 per cent of all cases of this size and type used.

The 105 mm. steel case is a one piece case, drawn from a steel disk by a series of two cupping, five drawing, and one tapering operation, along with the necessary steps required to form and machine the case head and primer hole. Fig. 1 shows each step except pre-cupping in order of operation. The steel used in the manufacture of this particular type of case is a special Army Ordnance Department cartridge case analysis, running about 0.22 to 0.32 per cent carbon and 0.45 to 0.75 per cent manganese. The choice of a steel for this item was difficult, since there were specific properties desired that in some ways opposed each other. First, the finished case must at all times form a stable container for the powder charge. It must act as an obturator, that is, it must be able to expand and form a seal between the case and the gun barrel so as to prevent firing gases from escaping through the breech. However, in addition to these properties and paradoxical to the latter, the steel had to be such that it would contract after firing so that the case could be automatically ejected from the breech.

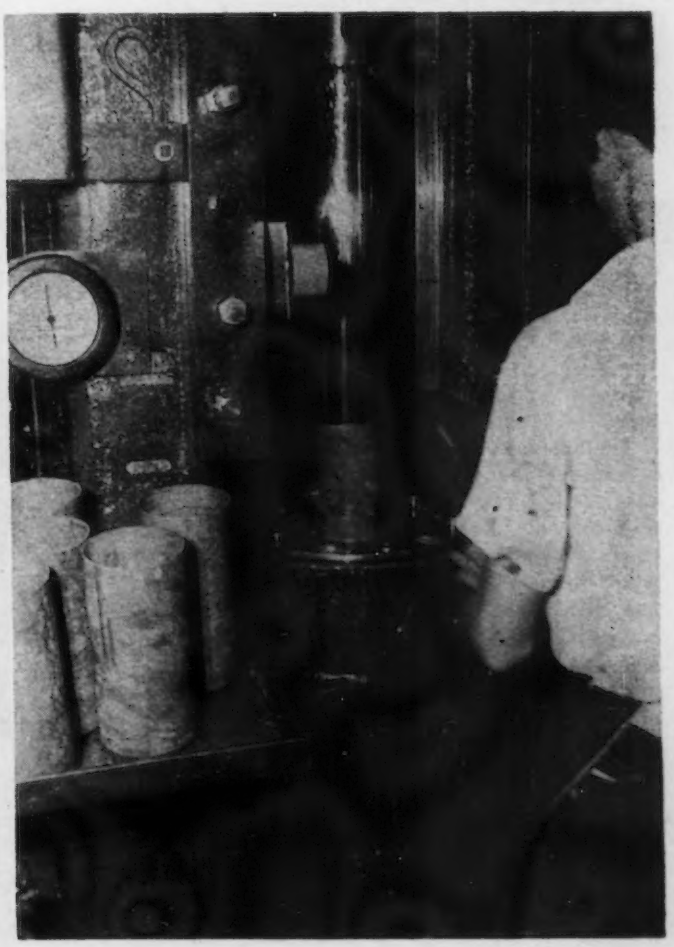
Pre-cupping

As the disk blank is received from the mill, it is 7.261 in. in diameter on one face and 7.385 in. in diameter on the other face, the edges, of course, being slightly tapered. The stock is 0.515 in. thick and the disk weighs 6.1 lb. This disk is then pre-cupped, a step that draws a shallow cup from which forming can be started and which serves as a check on whether or not the steel will withstand drawing strains. This pre-cupping operation is shown in Fig. 2, the disks being delivered to the operator on an inclined channel. Annealing in a gas-fired furnace relieves stresses set up in the steel by the pre-cupping draw and the shallow cup is then pickled. This pickling is done in a lead lined tank, the bath being heated by steam coils in the bottom of the tank. A clear water rinse follows the pickle.

One of the most important phases of the process of manufacturing the 105 mm. case is the cleaning system employed. While sufficient lubrication of various types of lubricants from heavy greases to light water soluble oils on the punches and dies is highly essential, it is important that the shell cases be clean when placed in annealing furnaces. Any oil or foreign matter deposits on the material would cause charring in annealing and leave a carbon deposit on the steel that might affect further drawing operations. Hot water sprayed with considerable force on each part following the drawing operations accomplishes this cleaning function.

The cupping draw, on a 400-ton press, is the second forming step. The base thickness of the cupped disk throughout the drawing operations

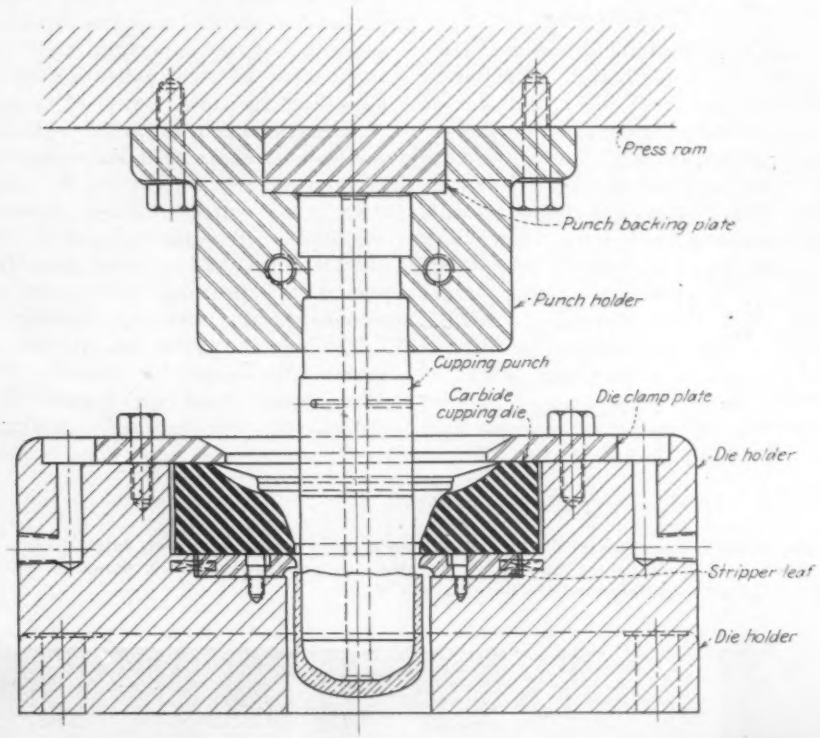
FIG. 2—(Left) This rack arrangement feeds steel disks to the operator of the pre-cupping press. Pre-cupping merely forms a shallow cup to start the drawing operations and acts as a check on the quality of the steel. A pre-cupped disk is shown in the operator's hand. (Right) An intermediate drawing operation.



remains quite constant, but the wall thickness is reduced as the case wall lengthens, as can be observed from Table I and Fig. 1. The cupping punch and die arrangement is shown in Fig. 3. The punch action on the steel disk in drawing and forming as it is pressed against the die sets up in the steel a kneading action. This forces the cup very tightly around the punch. To facilitate removing the cup from the punch on the up-stroke of the ram, the stripper leaf fingers hook the cup edge, holding it in place as the punch is withdrawn. These stripper leaves are backed up by coil springs and are rounded on the top sides. Thus, when the cup is forced through the die by the punch, the stripper leaves are backed up out of the way. However, their flat undersides engage the cup edge as the punch is withdrawn.

The finished cup passes through the bottom of the press into a tubular carrier that runs under the floor to a spray where the cups are, one at a time, force-spray washed with hot water to remove press lubricating oil and dirt. As the press ram comes down, it forces a cup into the die, which in turn forces the previous cup into the tube. With each successive press stroke, the cups move up a station through the spray to the unloading platform. The cups are unloaded into wire tote baskets and are annealed and pickled the same as following the pre-cupping operation.

After the pre-cupping and cupping operations, there is a series of five drawing operations between each of which the case is annealed, pickled, and washed. All draws are performed on hydraulic presses using Carboloy dies. The first is on a Hydro-Dynamic type 150-ton press. The operator shown in Fig. 4 is stationing the formed cup in this first draw press. The second draw is on a 100-ton press, the third on a 100-ton press, the fourth on a 75-ton press, and the final draw is performed on two 75-ton presses.



ABOVE

FIG. 3 — As the punch descends in this cupping operation, it forces the cup through the die which further forms it. As the cup falls below the die, the stripper leaves engage the cup edge, stripping it from the punch as the punch is withdrawn. The cups pass into a tubular arrangement through the bottom of the press that delivers them to a washing spray.

Following the second draw and prior to annealing and pickling, the bottom of the cup, which is rounded in shape, is flattened for forming the cartridge case head. This pre-heading is done on a 1000-ton mechanical press. Following the fourth draw, in addition to the pickle and rinse, the case is dipped into a soap solution. This soap solution, made up of one lb. of soap chips per gal. of water, facilitates the final drawing operation. Prior to the fifth draw, the top or mouth end of the case is rough trimmed to length on a roll trimmer.

In the pre-cupping and cupping operations, which use tool steel dies, the arrangement is as shown in Fig. 3. However, in the drawing operations, carbide dies are used. Details of this type of die setup are shown in Fig. 5. The stripper leaf arrangement for removing the case from the punch is slightly different here than in the cupping dies, as can be seen in the illustration. Here the stripper leaves are forced downward instead of backward by the cup as it passes through the die. The stripper leaves then spring over the edge of the cup as it is forced below the ends of the leaves. A coil spring under each stripper leaf brings it into stripping position. Then, as the punch is withdrawn, the leaves catch the cup edge, forcing the cup off the punch.

There is no annealing or pickling following the fifth and final draw, the case then being headed and dented. These operations are performed on one two-stage 1500-ton press. Since the amount of cold working of the case head to a great extent determines the physical properties of the steel, this

BELOW

FIG. 4—This operator is about to position the cup in the first drawing press. The cups are annealed and pickled between each draw to relieve strains in the metal and to break up elongated grain structure set up by previous draws.

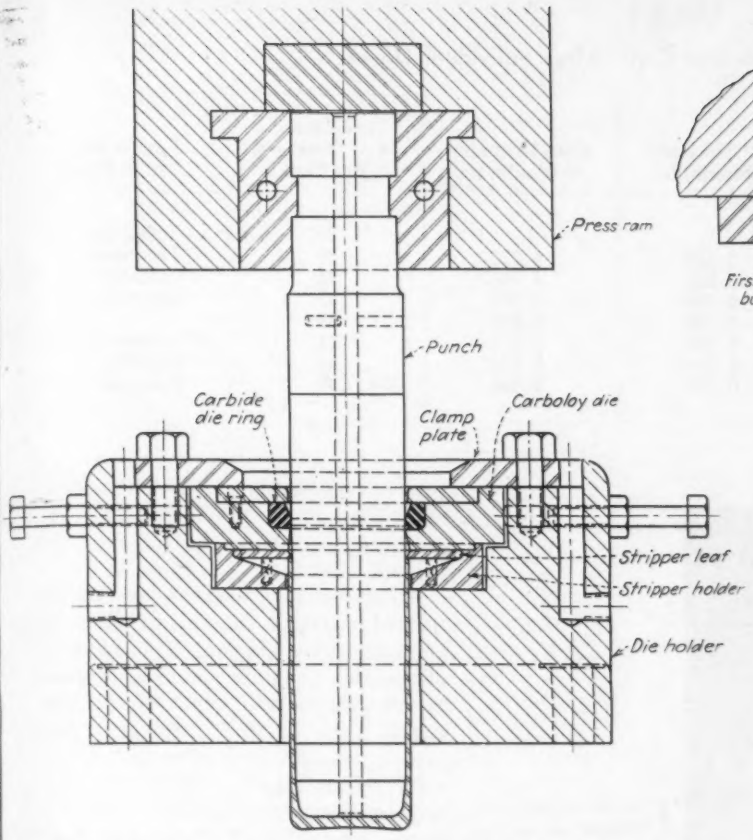


FIG. 5—This punch and die setup is typical of the drawing presses. Carboloy dies are used and the punch stripping mechanism is slightly different than that shown in Fig. 3 of the cupping press. This is the third draw die assembly.

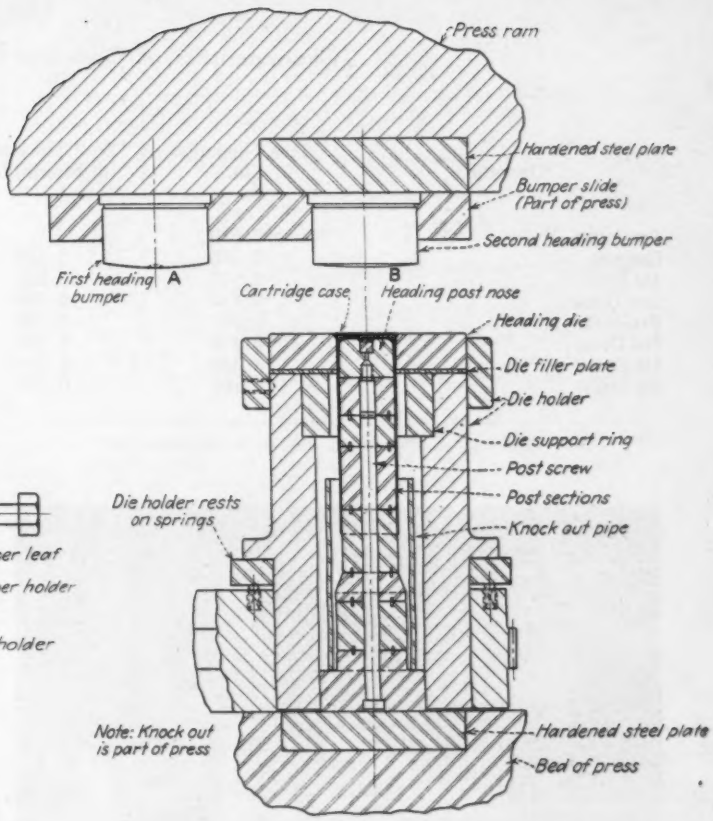


FIG. 6—This two-stage press arrangement is used to head the steel case. Heading bumper "A" is convex to force the metal of the case head toward the outer edge, forming the flange. The second bumper, "B", is less convex, permitting the metal to flow toward the center of the case head. This thickens the boss through which the primer hole is machined and serves to work-harden the head metal.

step is important. Care must be exercised that cracks do not appear in the head or cold shuts appear around the primer hole. By forming the head in this two-stage manner, the chances of these defects occurring are reduced. The first punch or "bumper"—A in Fig. 6—is bulged slightly in the center in the shape of a shallow segment of a sphere. The metal is thus forced to flow toward the outside edge of the case head, as well as filling the cavity in the punch that forms the thickened center part of the case through which the primer hole is drilled. The second bumper — B in Fig. 6—is flatter than the first and forces the excess metal at the edge of the head toward the center of the case head, thus adding metal to the primer boss and at the same time work-hardening the head. The primer hole indentation is performed in the first die setup, and together these two press operations get the desired metal hardness in the case head.

The finished shell from the head to the mouth is a constant taper, which is accomplished on a 75-ton press fitted with a taper die. The case mouth is pushed into a restricted die ring, pressure being applied to the head of the case. This is shown in Fig. 7, where the case can be seen positioned but the ram has not yet descended. The head of the case fits into the hollow base of the ram,

FIG. 7—The case is tapered on this press. The ram forces the case down into a hollow tapered die which gives it the finished taper.

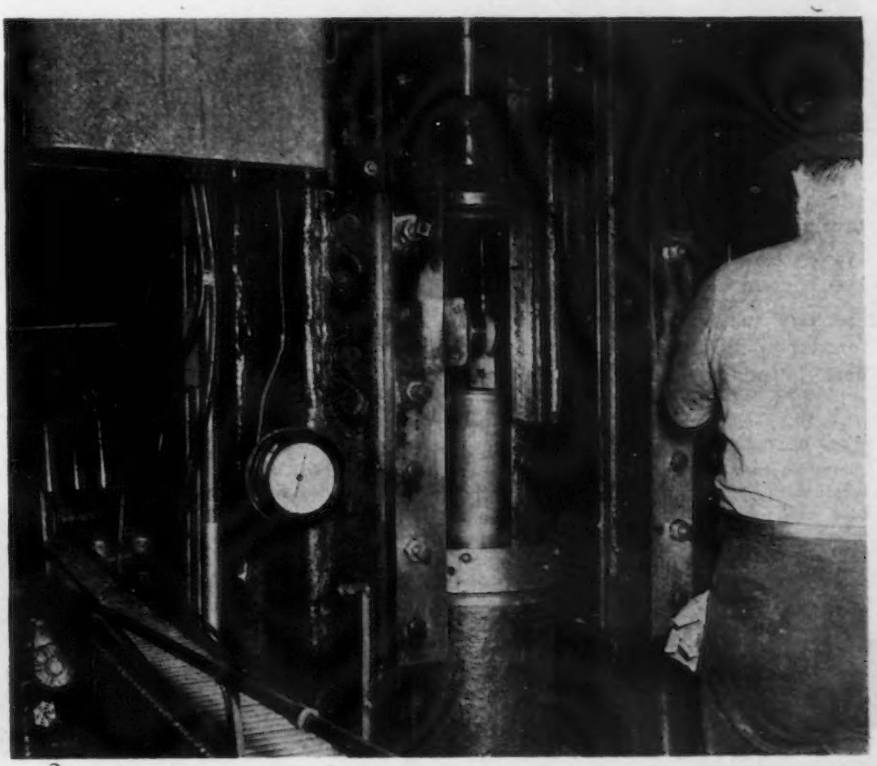


TABLE I

Characteristics of Cartridge Case After Individual Draws

Operation	Base Thickness, In.	Wall Thickness at Mouth, In.	Case Diameter at Mouth, In.	Reduction in Wall Thickness Per Cent	Type of Die Used in Press
Pre-cup*	0.510	.....	.....	20	Tool Steel
Cupping	0.510	0.325	4.972	36	Tool Steel
1st Draw	0.510	0.208	4.759	36	Carboloy
2nd Draw	0.510	0.133	4.580	35	Carboloy
Pre-Head	0.380	0.133	4.580	00	.....
3rd Draw	0.380	0.084	4.503	38	Carboloy
4th Draw	0.380	0.054	4.420	36	Carboloy
5th Draw	0.380	0.033	4.328	39	Carboloy

*Minor cupping to start form and test steel quality.

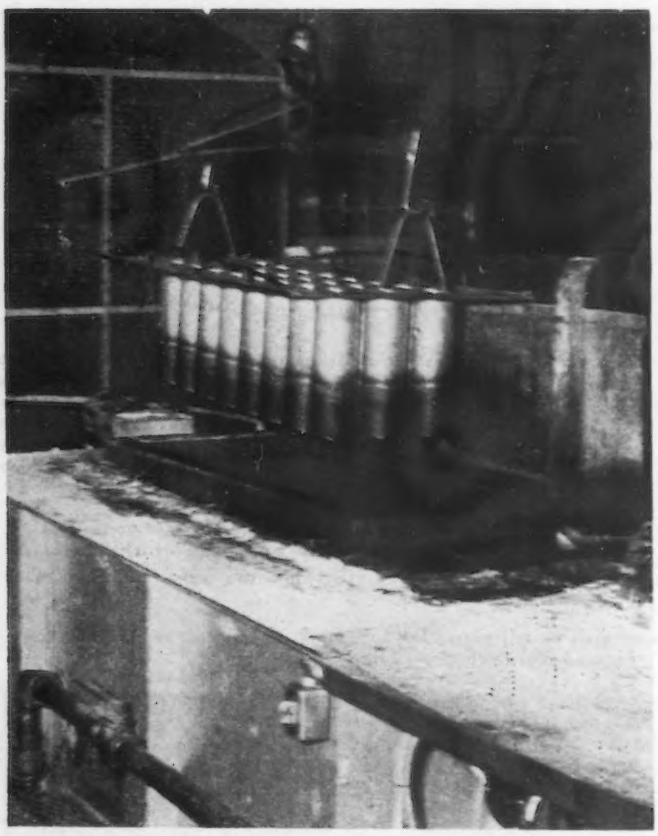


FIG. 8—To relieve stresses set up in the case mouth by the tapering draw, the mouth is annealed in a salt bath furnace. The cases are loaded in racks and placed into the bath in batches, as shown here.

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which forces the case down into the taper die.

Machining

Following the tapering draw, there are two machining operations performed to finish the case head. The first is on an automatic chucking machine. The wall of the case near the head is turned to proper diameter, the shoulder is machined from the case wall into the head, the head flange thickness is established, the head is machined to proper thickness, and a rough counter-bore of the primer hole is machined. The second machining is merely a finishing cut of the counter-bore and taper of the primer hole.

At this point, where a completely formed cartridge case exists, there is an inspection station. The case is gaged, the machining and primer hole is checked, and the length of the case gaged. On passing inspection, the case is washed internally and externally in an alkaline spray washing machine to remove all lubricating oils, soaps, grease, rust from handling, and other foreign matter. The case is then trimmed to finished length.

Case Mouth Anneal

A salt bath anneal for the mouth of the case, shown in Fig. 8, relieves stresses set up in tapering. The bath is liquid saltpeter and the cases are held in place by a specially designed rack through which the cases are dropped, mouth downward, catching on the case head flanges. This rack is handled by an overhead hand crane, the cases being changed in batches. A clear water rinse removes adherent salt, and then the cases are placed in a stress annealing oven. This annealing furnace is a continuous, recirculating type, gas-fired, the cases being drawn through the heating zone by a moving chain conveyor.

From the stress anneal, the cases are loaded on a cooling conveyor, an overhead moving line, which passes them through a water spray to the final inspection stations, one of which

FIG. 9—These cut-away sections of the steel cartridge case after each manufacturing operation illustrate how the bottom or head thickness is substantially maintained, while the wall thickness is reduced to form the case wall. As these drawing operations are quite severe, annealing is necessary between each press pass.

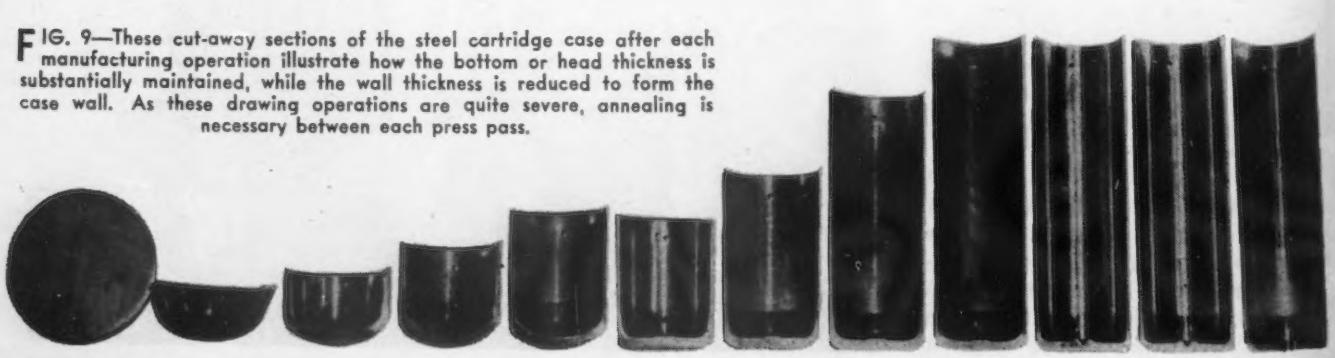

TABLE II

Operations in the Manufacture of a 105 mm. Steel Cartridge Case

(1) Pre-cupping steel disk, 200-ton hydraulic press.
(2) Inspection, visual for cracks and surface defects.
(3) Anneal, gas-fired annealing furnace.
(4) Pickle, steam coil heated tank.
(5) Rinse, clear water.
(6) Cupping, 400-ton hydraulic press.
(7) Force spray hot-water wash.
(8) Anneal, gas-fired annealing furnace.
(9) Pickle, heated tank.
(10) Rinse, clear water.
(11) First draw, 150-ton Hydro-Dynamic type press.
(12) Inspection of case wall thickness.
(13) Anneal, gas-fired annealing furnace.
(14) Pickle, heated tank.
(15) Rinse, clear water.
(16) Second draw, 100-ton hydraulic press.
(17) Force spray wash, hot water.
(18) Inspection of case wall thickness.
(19) Prehead, 1000-ton mechanical press.
(20) Inspection of head thickness.
(21) Anneal, gas-fired annealing furnace.
(22) Pickle, heated tank.
(23) Rinse.
(24) Third draw, 100-ton hydraulic press.
(25) Inspection of wall thickness.
(26) Anneal, gas-fired furnace.
(27) Pickle, heated tank.
(28) Rinse, clear water.
(29) Fourth draw, 75-ton hydraulic press.
(30) Inspection of wall thickness.
(31) Anneal, gas-fired annealing furnace.
(32) Pickle, heated tank.
(33) Rinse, clear water.
(34) Dip into soap solution for draw lubrication.
(35) Trim case at mouth to rough length.
(36) Fifth draw, 75-ton hydraulic press, two presses in use.
(37) Inspection of wall thickness.
(38) Heading and denting, 1500-ton two-stage hydraulic press.
(39) Inspection of flange and head diameter and head thickness.
(40) Taper case wall, 75-ton hydraulic press.
(41) Inspection, visual for scratches and material defects after tapering.
(42) Machine: Body at head to proper diameter; shoulder at case head; flange thickness; head thickness; and rough counter-bore primer hole on automatic chucking machines.
(43) Finish machine counter-bore and taper of primer hole on drill press.
(44) Inspection of machining; position and forming of primer hole.
(45) Wash, internal and external, alkaline spray washer.
(46) Inspection: Case gaged, machining checked, primer hole checked, and case length gaged.
(47) Trim case wall to finish length, roll trimmer.
(48) Salt bath anneal of case mouth.
(49) Clear water wash to remove adherent salt from salt bath anneal.
(50) Full case anneal, recirculating type gas-fired anneal furnace.
(51) Cool, conveyor and water spray cooling.
(52) Final inspection by Mullins and by Army: Profile check; taper check; inspection of head diameter, body diameter, flange thickness, case length, wall thickness at case mouth, primer hole depth and contour, and primer hole counterbore depth. Visual examination for surface defects inside and outside.
(53) Pickle and chromite dip, preparatory to painting.
(54) Inspection for metal laminations after pickling, visual.
(55) Paint inside and outside of case, with phenol formaldehyde varnish, in spray booth with water back drop for exhausting air of paint fumes.
(56) Paint drying, in infra-red drying ovens.
(57) Primer hole painted, hand spray.
(58) Paint inspection, visual.
(59) Packaging, nine cartridge cases to corrugated paper carton, for shipping.

is operated by Mullins and the other by the U. S. Army Ordnance Department inspectors. At this point, inspections are rigid and complete. A profile gage, simulating the breech of a 105 mm. gun, gages the wall taper. Subsequently, head diameter, body diameter, head flange thickness, case length, wall thickness at the case mouth, primer hole depth and counterbore, and case finish are inspected.

The cases then progress through a pickle and chromite dip which cleans and prepares the metal surfaces for painting by giving them a rust-resisting film. This bath is heated by steam coils. Following a visual inspection for laminations after this chromite dip, the inspection approval stamp is applied and the cases proceed to the painting department on a chain conveyor.

Painting

In a specially designed spray booth the cases are sprayed internally, externally, and on the bottom, being held is an upright position by pins that fit into the primer holes. The cases are delivered to the sprays on a circular conveyor. The cases, in progressing toward the spray, trip a control that turns the spray on, and, as the spraying cycle is complete on each case, the spray is automatically turned off. A forced draft blows the spray fumes into a water wall which washes them into the sewer. The coating used is a phenol formaldehyde or bakelite base varnish. From the spray, the conveyor carries the cases to a long bank of infra-red drying ovens.

Various inspection stages throughout the forming operations are set up to insure against trouble of a recurring nature in the formation of the steel cases, such as off-register dies, scoring of the case from foreign material or cracks in the dies, etc. These inspections begin with a visual inspection following the pre-cupping. Wall thickness is inspected after each draw, and after preheading the case is checked for head thickness. After the heading operation the flange diameter as well as the head diameter and thickness are gaged. After tapering, the case is visually inspected for scratches or blemishes; and after machining the case is inspected for proper machining as well as for positioning and forming the primer hole and counterbore and for case length.

Starting with a 6.1 lb. steel disk, after forming, trimming, and machining, the finished case weighs 5.1 lb., a metal loss of about 1 lb. Careful check on case wall hardness must be maintained so that on completion the case will be uniformly hard, with a finish hardness of 94 to 96 Rockwell B. Cutaway sections of the drawing steps in the manufacture of the case are shown in Fig. 9.

The drawing operations cause quite severe reductions in the thickness of the case wall and work harden the metal so that anneals are necessary between draws to prevent splitting. Once the shoulder between the case wall and what eventually becomes the head is established, there is no metal drawn from the head, the walls being formed from what metal extends beyond the shoulder. To perform this shaping, the wall thickness must be greatly reduced and extended in a longitudinal direction. In Table I, the reductions by draws are shown, ranging from 20 per cent in the pre-cupping operation to 39 per cent in the fifth draw, the most severe of all.

The wall thickness of the case is determined by the difference in diameter of the punch and the die. These differences vary slightly with the draw and tend to reduce as the drawing operations proceed.

. . . Thermal Reduction of M

By DR. F. J. HANSGIRG
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IN the Fall of 1934, the magnesium process was sufficiently perfected to allow its application in a commercial plant. American Magnesium Metals Corp. founded Nippon Magnesium Metals, in Osaka, together with Nippon-Chisso, a Japanese fertilizer concern. In 1935, the first plans and designs were made for erection of a 1000-ton unit at the plant site of the above mentioned company in Konan, Korea.

A 3000 kva three phase furnace was erected, and at the beginning the oil paste method was installed. The rotating table baking machine mentioned previously was erected to granulate the magnesium dust by the oil paste method. Vertical shaft furnaces were also installed for distillation of the granulated magnesium dust. The paste baking equipment and the shaft distillation furnace were an entirely new development at that time, and the company was quite conscious that much experimentation would be necessary to develop these systems commercially. At the end of 1936, the plant started to operate, but with interruptions, as during operation on a larger scale many new problems occurred.

The baking of the dust with hydrocarbon oils was later given up, and dry dust presses were installed. Also the operation of the continuous shaft furnace was still very unsatisfactory. Because of the difficulties described before, the author has come to the conclusion that the problem of a continuous distillation of the magnesium dust, while not insoluble, needs much more experimentation for a final solution.

As it was necessary to reach capacity production with the Korean plant, in 1937 a new batch distillation system was developed in Konan, which was simple and immediately successfully. The liquid condensation of the metal was replaced by a sublimation process, or condensing in solid form[12]. The method consists in providing a ring shaped space inside of a retort, which space is filled with the magnesium dust tablets (Fig. 12). The retort made of mild steel is inserted in an electric resistance furnace by means of a gas light flange, and both retort and the furnace are evacuated. By this arrangement the mild steel wall at a temperature of about 1400 deg. F. is released from outside stresses caused by atmospheric pressure. Therefore retorts of quite large dimensions can be constructed without the necessity of using heat resistant steel alloys or a great wall thickness for the retort body. In the sublimation process, the metal is condensed in the form of a solid ring on the surface of a moveable sleeve inserted on the top of the retort. This ring had a weight, in Konan, between 1200 and 1500 lb. and showed a crystallized surface on the inside (Fig. 13).

The experiments with this type of sublimation process were already started at the time the hydrocarbon baking method was still in use. During that time the observation was

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FIG. 13—Magnesium ring weighing about 1500 lb., as removed from the retort at Konan. The ring is solid metal, with only the surface of crystals.

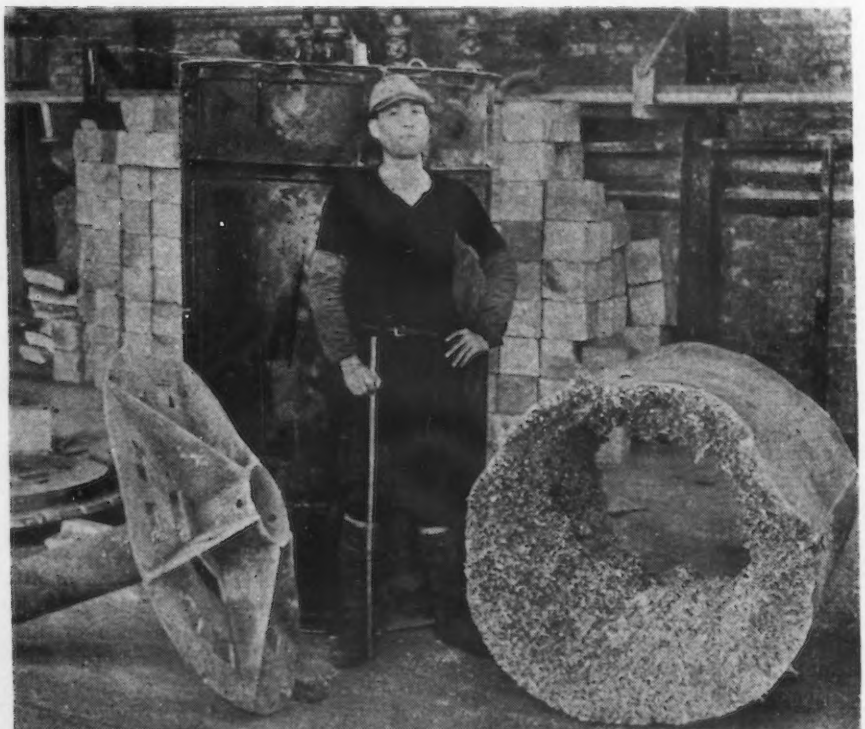
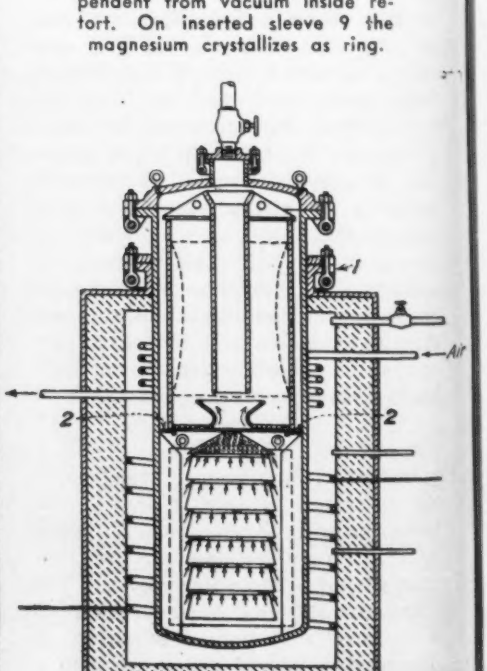


FIG. 12—Section through sublimation Retort and Furnace, as first time used 1936 at Konan and in larger scale at Permanente. Flange 101 closes gas-tight the electric heating furnace so that it can be put under vacuum independent from vacuum inside retort. On inserted sleeve 9 the magnesium crystallizes as ring.



Magnesium Compounds. . .

. . . Concluding his two-part article, the author describes commercial development of the carbothermal process for reduction of magnesium compounds, of which he is the inventor, at Kaiser's Permanente plant and in Korea. In addition he discusses broadly other methods of reduction, and the commercial future of magnesium. Part I of the article, presented last week, dealt in detail with experimental development of the carbothermal process.

made that any hydrocarbon remaining in the granulated mass disturbed the crystallization of the magnesium in the sublimation process. It was difficult to drive out in the baking process the heavy hydrocarbons even at temperatures of about 1100 deg. F., and these hydrocarbons evaporated during the sublimation in vacuum together with the magnesium vapors, and caused the troubles in condensing. The hydrocarbons prevented the formation of a solid metal ring, and caused the growth of a fine aggregate of crystals. In such form, the magnesium was very inconvenient for remelting, as the fine crystals gave a high burning loss during the melting process. The solid magnesium ring, as later produced from the dry tableted dust can be easily remelted with a burning loss of not much higher than 2 per cent, whereas fine crystal aggregates give a burning loss up to 10 per cent. As the remelting of the sublimated product is the last step in the process, the yield in this step is essential for economy, any loss at this step affecting the total cost of the process.

The possibility of producing metallic magnesium with the carbothermal reduction process was established beyond any doubt by the Konan plant. Using 3000 kva reduction furnaces (Figs. 14, 15 and 16) and using hydrogen as a chilling gas with a power cost of 2 mills per kw. hr., the total production costs of the metal cast into solid bars was between 12 and 14c. per lb.

Konan was selected for the plant site because the fertilizer plant of Nippon-Chisso had a large installation for producing hydrogen by electrolysis. The original plan was to have the electrolytic hydrogen pass the magnesium plant first, picking up about 2 per cent carbon monoxide and to have this gas, after the usual methods of chemical purification, later supplied to the catalytic ammonia plant. In order not to disturb the ammonia process by any irregularities in the magnesium plant, a final arrangement was made to use hydrogen gas in a cycle after removing the carbon monoxide by washing it out with ammoniacal copper solution. Any moisture contained in the chilling gas would affect the yield of magnesium, as water vapor reacts with metallic magnesium in this fine distribution, forming magnesium oxide and hydrogen. The washing process with copper solution saturated the gas with moisture so that the hydrogen was dried with silica-gel before entering again into the magnesium process.

By the end of 1938, the Japanese

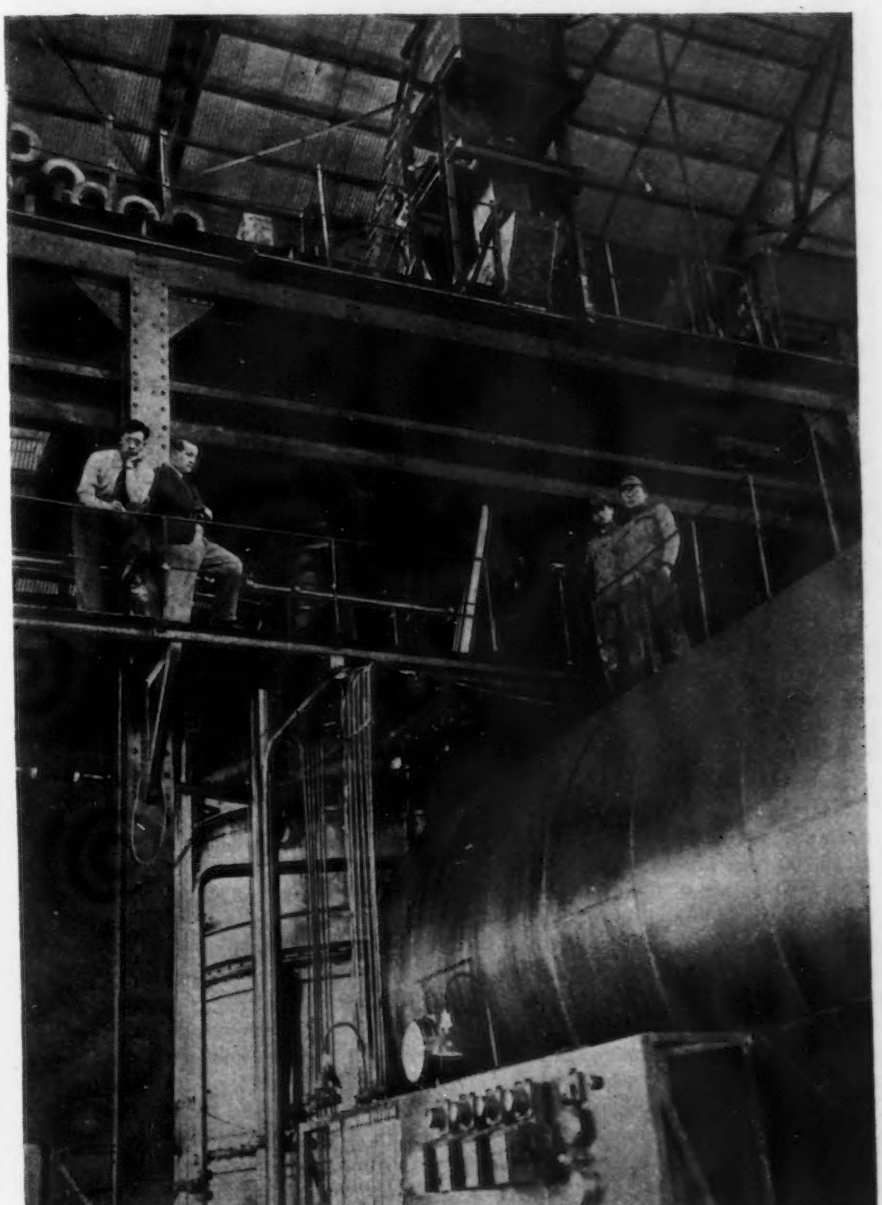


FIG. 14—3000 kva reduction furnace erected in 1935 at Konan, Korea. In the center, the furnace body is visible with control panel for gas flows. On the right side is the expansion chamber, on top the charging device, where raw material briquettes were charged from a moveable bin.

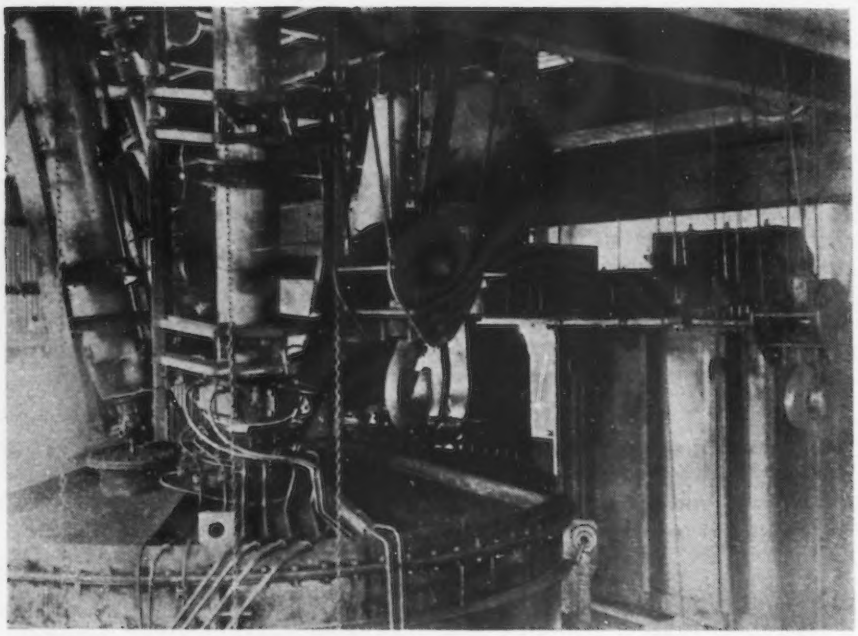


FIG. 15—Top of the furnace shown in Fig. 14. Note the 8-in. graphite electrodes and the glands with cooling pipes. As such a closed furnace is practically cold on the outside, transformer is installed close to furnace, shortening heavy bus bar lines.

company erected a second unit and in April, 1940, at the time the author left Japan for good, the erection of a third unit was contemplated. During all these years vast experience was accumulated concerning the details of furnace operation, tableting and sublimation of the metal.

In the Fall of 1940 the author lived in the United States, and was, as an officer of the American Magnesium Metals Corp., interested in the expansion of magnesium production in the United States. In January, 1941, negotiations were started between the Henry J. Kaiser interests and the American Magnesium Metals Corp., and the Kaiser group bought the U. S. patents covering the carbothermal reduction process. The author was appointed consultant for the design and erection of the Permanente magnesium plant.

As the total production of the Permanente plant was contemplated as 12,000 tons a year, it was of course not possible to use 1000-ton units like those developed in Konan; also, the retorts had to be enlarged to reduce their number. The natural gas coming from California gas fields contains mainly methane, very small amounts of carbon-dioxide and nitrogen, and a small percentage of the higher homologs of methane. The Permanente cement plant uses about 17,000,000 cu. ft. of natural gas a day for the burning of cement clinker and lime in rotary kilns. It was planned to conduct this gas first to the magnesium plant to use it, instead of hydrogen, as a chilling agent, and, after having picked up about 6 to 7 per cent carbon monoxide, to conduct this gas to the rotary kilns where it is used as a fuel. There was a lot of speculation and argument among chemists as to whether the natural gas, as mainly consisting of methane, would be split into hydrogen and carbon, or would form other hydrocarbons upon coming in contact, even for a short time, with the magnesium vapors and carbon-monoxide mixture at a temperature of 3600 deg. F. But what was already known about the stability of methane, led to the belief that the time of contact at high temperature would be too short to have any considerable influence on methane gas, which is so many times more stable than liquid hydrocarbons.

But there were many changes introduced in the Permanente plant, as compared with the plant in Korea. It was decided first to erect one unit with a capacity of 3500 tons a year, and later to multiply the plant capacity by adding more units. The difference between the plant at Permanente and the one at Konan were considerable as can be seen from Table I. Even if these changes were quite considerable, it was expected that the problem could be mastered with all the experiences accumulated since 1930.

The plant was to have a trial opening in September, 1941, and the large reduction furnace operated immediately to full satisfaction. Only one difficulty occurred: The dust did not tablet, so that the retorts for sublimination could not be charged. As the management of the plant had committed itself to produce metal for the U. S. Government on a certain date, it was proposed to overcome this difficulty temporarily by introducing the old method of coalescing the magnesium dust to magnesium grains as disclosed in *Hansgirg U.S. Patent No. 2,025,740.*

For this purpose a temporary arrangement was made to fill the retorts directly with the magnesium dust coming from the reduction furnace in by-passing the tableting machines. During the filling of the first retort, unfortunately a rubber connection piece opened and magnesium dust flew out in the air, catching fire and burning four workers so badly that they lost their lives. This accident, entirely unconnected with the normal plant operation, renewed all the old stories that the carbothermal reduction process is extremely dangerous in operation. The plant management, influenced by a group of engineers very much in favor of the hydrocarbon chilling process, insisted on the elimination of the dry-tableting, and in going back to the old process, used in 1934 in Austria, of baking the dust with hydrocarbon oils, as already described *Hansgirg, U.S. Patent No. 2,101,904.* As previously explained, this hydrocarbon paste method was used at Konan on a large scale and given up there as uneconomical.

The author made every effort at that time to influence the plant management toward studying the possibility of dry tableting of the dust in a scientific way, and investigating why the dust produced at Permanente did not tablet, while that produced at Radenthein, Konan and at Swansea, England, tableted easily.

It would have been easy to find out by the process of elimination whether chilling with natural gas, or difference in raw materials, or certain electrical conditions in the reduction furnace were responsible for the different behavior, but, unfortunately, the management insisted on the hydrocarbon paste method and very primitive equipment was installed. No special equipment for baking this paste was used. The paste was directly charged into the sublimation retorts, and from these retorts the hydrocarbons were first distilled off (Fig. 17). Later, by raising the temperature, the magnesium was recovered by sublimation. The number of retorts was previously carefully based on an operation cycle of 72 hr., so that by the additional time necessary to drive out the hydrocarbons, the time cycle of the retorting plant was entirely disturbed.

Many other inconveniences occurred

because of the fact that these retorts were never designed for distilling hydrocarbon oils. All this could have been overcome. But the distilling off of the hydrocarbon oils in the sublimation retort itself results in a disturbance of the sublimation process by the heavy hydrocarbons, which are partly distilling at the same time as the magnesium starts sublimation.

It has been previously mentioned that the presence of hydrocarbons in the sublimation retort prevents the forming of a solid magnesium ring, and the metal is deposited in comparatively loose crystal aggregates, which causes great losses in remelting for the purpose of casting the metal into ingots (Fig. 18).

Finally, with all these temporary adjustments, the plant unit was operating quite successfully with reduced capacity up until the time of Pearl Harbor. Unfortunately the writer of this article, as an enemy alien born in Austria, was detained 10 days after Pearl Harbor. With the existing rules, his further connection with a defense plant was no longer possible.

The month before Pearl Harbor, the plant management had already decided to use hydrocarbon oils as a chilling agent for the second unit, and an entirely new plant was designed by Permanente engineers for that system. As a chilling agent, low boiling hydrocarbon oils, which evaporate during the chilling process and later are condensed together with the magnesium dust, should be used, forming a thin slurry from which the magnesium dust has to be separated.

It was proposed to use an electrostatic separation method, as had already been used successfully for the de-waxing of hydrocarbon oils by the Union Oil Co. of California. A similar experiment on a very small scale was tried out for magnesium dust slurries at the high tension laboratories of Stanford University. The author warned the plant management on many occasions that it would be a great risk in a process industry to install a plant of full size capacity without going through a pilot stage.

But all warnings were in vain, and a second unit was built to use the hydrocarbon oil-chilling method, given up by the author in Radenthein, in 1933, as entirely uneconomical and difficult to operate. As far as present information goes, the second unit with the hydrocarbon oil chilling was a complete failure, and it was necessary to rebuild the plant using the gas chilling method according to the old design of the No. 1 unit.

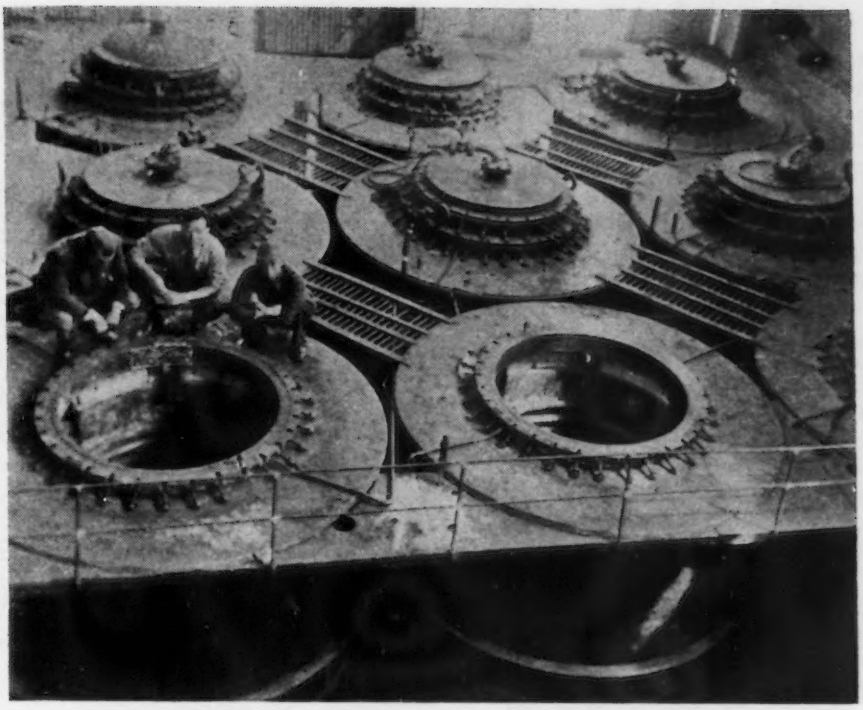


Fig. 16—Retorts and retort furnace battery at Konan. Capacity here was 5000 lb. a day.

The analytical investigation of the magnesium dust produced at Permanente shows a lower magnesium content and a higher carbon content than the dust produced at Radenthein and Konan. The author has not been informed whether the careful raw material balance and gas balance, proposed by him, has ever been made, to decide whether using natural gas as a chilling agent causes a less efficient prevention of the back reaction, or whether the dust is diluted by carbon resulting from a partial cracking of the methane, or whether an incomplete reaction in the furnace has taken place by using a graphitic type of a reduction carbon against anthracite.

There are several questions unsolved, as, for example, the influence of the raw material; Konan uses dead-burned natural magnesite containing iron oxide, whereas, at Permanente, only iron-free magnesia is used from a sea water precipitation process. It is important to investigate all these questions so that a magnesium dust may be produced which tablets as easily as the dust produced at Radenthein, Konan, and Swansea. As long as any hydrocarbons are used in the carbothermal reduction process, the author is very doubtful that magnesium can be produced at a price competitive with the electrolytic process.

The carbothermal reduction process has been dealt with in detail, as the author has had special experience in its development, and as it is the largest installation for a thermal reduction process in the U. S. But carbon is not the only agent which can be used for the reduction of magnesium compounds. Other reducing agents exist which have the great distinction of producing oxides which, at the reduction temperature, are not in the gaseous state, so that only magnesium vapor is delivered in such reduction processes. The oxide formed by the reducing agent remains in solid or liquid form in the reduction chamber. In such cases the magnesium is constantly removed from the other components, forming a system in the equilibrium state, and therefore such reactions can proceed to the end; also no back reaction is possible, as the magnesium has already separated from the other components. It looks, therefore, at first glance, as if such processes can be operated more simply, as no special means of chilling are necessary to recover the magnesium.

Such reducing agents are aluminum, silicon, and calcium carbide. The main difficulty is that all the above mentioned reducing agents are very expensive in comparison with carbon, so that the economy of these processes still remains doubtful, unless special arrangements and local conditions influence the economy to their advantage. The oldest of these processes operated on a commercial scale was the reduction of magnesium oxide with calcium carbide. This proceeds according to the equation:[15]

$$MgO + Ca C_2 \rightarrow Mg + CaO + 2C$$

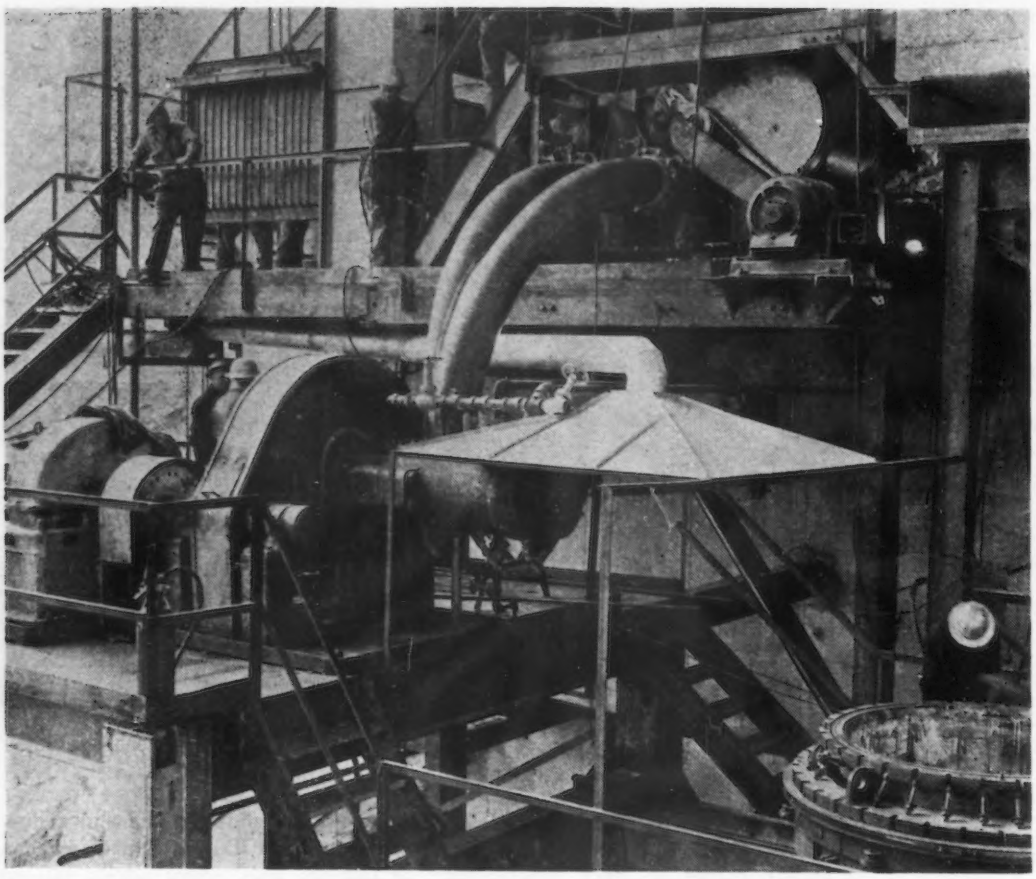


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FIG. 17—Filling station at the Permanente plant, for filling magnesium dust paste into retorts.

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Murex Co. in England used this process as it could import calcium carbide very easily from Norway. The calcium carbide is finely ground together with the magnesium oxide, and the powdered mass tableted without a binder. These tablets are heated under high vacuum in a retort at a temperature of 1800 deg. F. The magnesium evaporates and condences on the cooler part of the retort in the form of a solid ring. This process has been operated since 1936 from small retorts, and the metal was recovered in 20-lb. batches.

When the author arrived in California in June, 1940, he got in contact with Marine Magnesium Products Corp. at South San Francisco. He had long planned to use magnesia recovered by precipitation from sea water for the carbothermal reduction process. The idea of using sea water as a source for metallic magnesium goes back to 1936, when the author, in Korea, began corresponding with Marine Magnesium Products Corp., to study this possibility. This company has done pioneering work in solving the problem of extracting magnesium compounds from sea water for pharmaceutical uses. The precipitation of the magnesium compounds consists mainly in reacting a lime slurry with sea water in a Dorr thickener. An exchange of ions takes place. The magnesium chloride contained in sea water forms magnesium hydroxide, which is precipitated, calcium chloride going into solution in the sea water. It is therefore a question of cheap lime to carry out this process economically. In any case, magnesium hydroxide is first precipitated from the sea water, and it depends on the subsequent process selected whether the magnesium hydroxide is calcined to magnesium oxide, or whether magnesium is made from such oxide by the carbothermal or any other thermal reduction process, or whether the magnesium hydroxide is dissolved in hydrochloric acid to make, finally, anhydrous magnesium chloride, the starting material for the electrolytic process.

As lime is necessary for the precipitation of magnesium hydroxide from sea water, the writer conceived the idea of combining the calcium carbide reduction process with the magnesium hydroxide precipitation from sea water. The above mentioned equation of the reduction of magnesium oxide with calcium carbides shows that a residue remains consisting of calcium oxide and carbon. As the reduction with calcium carbide is carried out at a temperature of 1830 deg. F., it is a reaction between solids, none of the components of this equation melting at 1800 deg. Such reactions are always incomplete and therefore the residue contains additional unreacted calcium carbide and magnesium oxide, which all goes to waste and reduces the economy of the calcium carbide reduction process.

If this residue is slaked with water, then the unreacted calcium carbide and the calcium oxide form calcium hydroxide (lime slurry) accompanied by the carbon as a residue from the carbide decomposition. Such slurry reacts just the same as pure lime slurry with sea water, the calcium hydroxide going into solution as calcium chloride, and the magnesium chloride of the sea water precipitating as magnesium hydroxide. The only difference is that the magnesium hydroxide contains the carbon from the carbide. This is an advantage as the settling rate of the magnesium hydroxide precipitated from the sea water is higher with the carbon content than without it, which fact reduces the Dorr thickener installation, and finally, the carbon acts as an additional fuel during the calcination process to produce magnesium oxide from the hydroxide.

The great economic feature in this combination consists in that the lime is first used to make calcium carbide, and after the magnesium reduction, the lime contained in the residue is later used to precipitate new magnesium hydroxide from sea water. So it can be said that for this combination only lime and coke and sea water are necessary to produce the metal.

This process is protected in several patent applications taken in the name of the author and assigned to Marine Magnesium Products Corp.

The difficulty of the whole calcium carbide reduction process at present consists only in the lack of large scale equipment. Steel retorts working at a temperature of 1800 deg. F. must be constructed either of high chromium nickel alloyed steel, or if made of mild steel, special equipment and protection methods must be used to prevent the mild steel from oxidation; also, a great wall thickness is necessary to operate these retorts at such high temperature. As will be seen later, these difficulties increase if ferro-silicon is used as a reducing agent. If it is possible to solve the equipment question, the calcium carbide sea water combination process can thoroughly compete with the carbothermal and the electrolytic processes, and its operation would be comparatively simple.

Aluminum, especially scrap-aluminum, has also been proposed as a reducing agent of magnesium. The methods are about the same as those described under reduction with calcium carbide. A very interesting process has been developed by Calloy Corp.[14] in England, consisting of the reacting of magnesite lumps in a crucible in a bath of molten aluminum between 1650 and 1830 deg. F. The aluminum reduces the magnesium oxide and an alloy is formed containing up to 15 per cent magnesium. Such alloys can be used directly or to produce metallic magnesium in pure forms. The aluminum-magnesium alloy is treated with liquid lead which does not mix with the aluminum. The magnesium dissolves in the lead and is recovered from this metal by electrolysis, using the molten lead alloy as an annode.

This process was already developed in a pilot stage in 1934, and with the magnesium prices then current, it appeared possible to produce magnesium from scrap aluminum under competition. With the present world shortage of aluminum, any magnesium process based on the use of aluminum cannot be used.

The third reducing agent now used on a commercial scale is high per cent ferro-silicon containing 75 to 80 per cent silicon. The use of silicon and ferro-silicon as reducing agents dates back to 1915 when W. F. Bleecker and W. L. Morrison used this reducing agent for the direct reduction of magnesium oxide in an arc furnace according to the equation:[15]

$$2\ MgO + Si \leftrightarrows 2\ Mg + SiO_2.$$

But with this method only a high per cent magnesium dust can be produced and it does not allow the recovery of magnesium in a liquid or solid state. At the high temperatures of reduction, side reactions with the carbon electrodes take place which deliver enough carbon monoxide gas, oxidizing the magnesium during the condensation to such an extent that only magnesium powder is received in the condenser.

Later G. Gire and R. Fouquet proposed a method similar to that described before for the reduction of magnesium oxide with calcium carbide.[16]

The mixture is heated to a temperature between 2100 and 2200 deg. F. to evaporate the magnesium and to condense it in solid form. Pioneer work in the use of ferro-silicon as a reducing agent, has been done by I. G. Farben in Bitterfeld, Germany. It was found there that magnesium oxide is more easily reduced by silicon or ferro-silicon in the presence of lime, using calcined dolomite, which consists in equimolecular parts of magnesia and lime. The reduction proceeds according to the equation:[17]

$$2(MgO.\ CaO) + Si \rightarrow 2Mg + Ca_2Si\ O_4$$

It seems that the formation of calcium

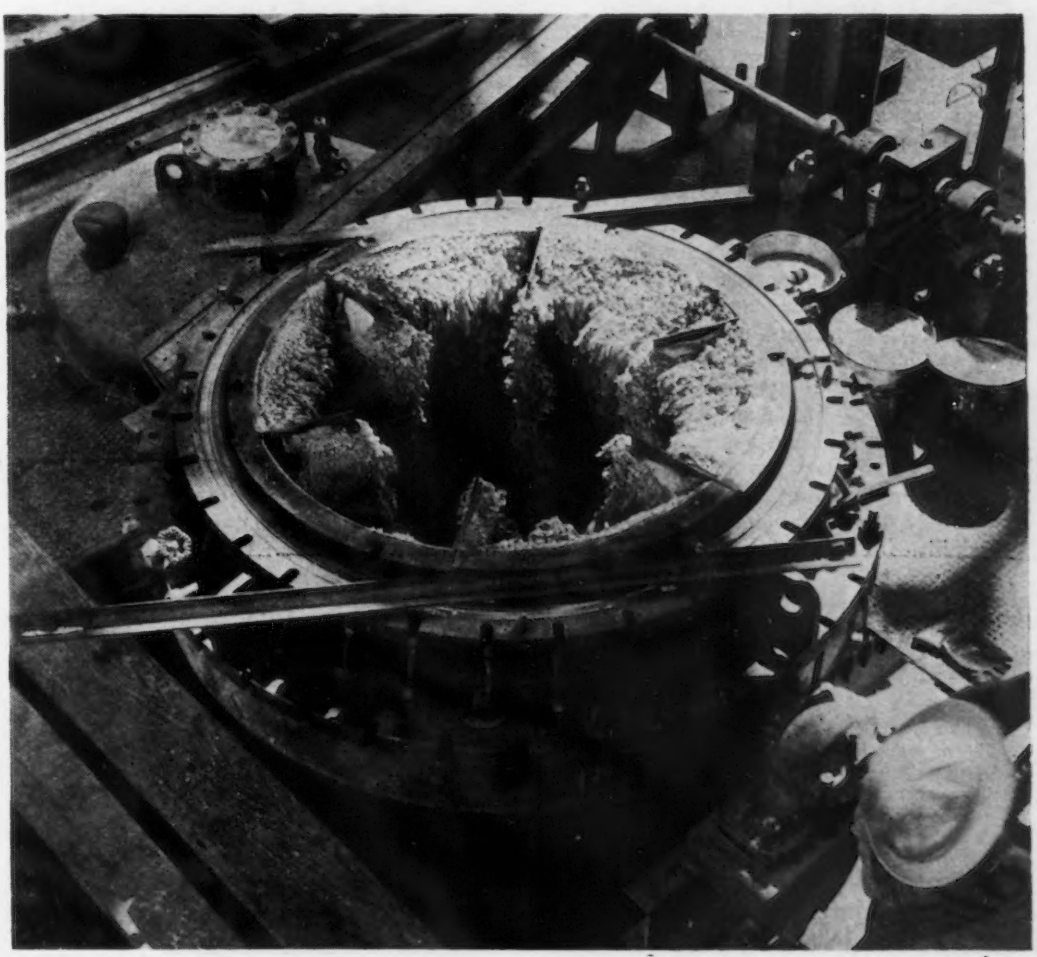

FIG. 18—Magnesium as deposited at Permanente. The fine crystals aggregate but do not form a solid ring as at Konan. Such crystals give a high melting loss during remelting and casting for ingots.

ortho-silicate makes the reaction more complete at a temperature between 2100 and 2200 deg. F. I. G. Farben patented several processes and apparatus on this equation. But in this case the same difficulty of equipment occurs, counteracting so simple a proposition as to heat calcined dolomite with silicon or ferro-silicon to a temperature of 2100 deg. F. under vacuum. The author has also proposed continuous working equipment for carrying on the reaction of the calcined dolomite with silicon.[18]

In the Western Hemisphere, Dr. W. Pidgeon has taken up research for the production of magnesium from dolomite, using 75 per cent ferro-silicon as a reducing agent. He was going back to the old oil fired retort as used by Murex Co. (England) for the carbide reduction process, with the increased difficulty that high chromium alloyed steel equipment has to be used to withstand high vacuum at such high temperature. Dr. Pidgeon developed multiple units consisting of 40 retorts of comparatively small size, about 8 ft. long and with an inside diameter of 8 in. The ground calcined dolomite is mixed with ground ferro-silicon and the mixture pressed into small tablets. These tablets are preheated to a temperature of about 1300 deg. F. to remove absorbed gas, and are then charged by hand in the hot horizontal retorts. The time of one cycle for each retort is about 6 hr., and the production in each cycle is about 8 to 10 lb. of magnesium metal.

The simplicity of this arrangement induced the War Production Board and the War Department to use this process for several U. S. defense plants. Ford Motor Co. also erected such a plant. The process is very suitable for providing magnesium production for immediate needs, but as long as it is carried out with comparatively small retorts, the production costs, including plant amortization, will surely be not below 25c. per lb., under the most favorable conditions of cheap power, and cheap raw materials. The process has some great possibilities if it should be possible to make it continuous, with consequent reduction of labor costs, which the author estimates at present to be 20 to 25 per cent of the total production cost.

As for all the processes using calcium carbide, ferro-silicon and aluminum as reducing agents, it can be said that these agents are themselves quite expensive, as they represent an invested form of electric power. In all these cases it is necessary to deal with a carbothermal process which uses an intermediary step of reduction to keep the carbon monoxide away from the magnesium. Calcium carbide is made by reducing lime with carbon to form carbon monoxide as a gaseous by-product, and silicon is made by reducing silica with carbon, forming carbon monoxide as a gaseous by-product.

Both compounds represent matter of higher energy level and can be then used for magnesium reduction at a much lower temperature than is possible in the direct reduction of magnesium oxide with carbon. But the direct reduction of magnesium oxide is carried on in a special electric furnace of high thermic efficiency, whereas the production of calcium carbide and ferro-silicon is carried on in open electric furnaces with comparatively low thermic efficiency. According to the laws of thermodynamics about the same energy is necessary theoretically, if calcium carbide is first formed and used to reduce magnesium oxide to metallic magnesium, or if magnesium oxide is directly reduced with carbon.

The same is also true of the silicothermal process, but the efficiency of the first step of making calcium carbide or ferro-silicon is very low, and also the efficiency of the second step of reducing magnesium oxide or dolomite with calcium carbide or ferro-silicon respectively, brings additional losses so that the over-all consumption per pound of magnesium produced must be greater than in the direct carbothermal reduction process.

There has been much controversy about the future use of magnesium metal, or, better, its alloys. The good qualities of magnesium alloys, in comparison with other light metal alloys, have been established to the greatest degree. Magnesium alloys can be rolled and extruded just as well as aluminum alloys or brass, and as concerns corrosion, magnesium alloys are surely superior to ordinary steel. Everybody can make the simple experiment of burying a piece of normal mild steel and a piece of any magnesium alloy in the ground, and looking at the samples after one year. The magnesium will show just a fine gray coating but the iron piece will, to a great extent, have been destroyed by rust. Each of these metals need a coating of varnish to stabilize its surface against corrosion. The author's opinion is that the use of magnesium on a large scale depends on price. Present prices are about 21c. for magnesium alloys, 15c. for aluminum, 7c. for brass and 2.4c. for alloyed steel, per lb.

Taking the weight relation of equal strength, a beam of steel of the same strength as a beam of magnesium alloy weighs four times more, so that magnesium would become equal in use to steel if its price could be lowered to 10c. per lb. This is the point where the thermal reduction process becomes important. The electrolytic process has been perfected to a great extent so that it is not to be expected that even in the largest scale operation the price can be lowered considerably. The thermal reduction processes are at just the beginning of their development, and by introducing better methods it looks possible, especially by selection of cheap and abundant starting materials, to lower the price to the neighborhood of 10c. per lb., which will mean an entire revolution in the use of metals.

To achieve this goal for the carbothermal reduction process, only the necessity of improving the efficiency of the second step—the recovery of the metal from the magnesium dust—remains. Such improvements are now under development by the author.

TABLE I

Comparison of Konan and Permanente Plants for Carbothermal Reduction of Magnesium Compounds

Konan Plant	Permanente Plant
3000 kva reduction furnace	8000 kva reduction furnace
Chilling with hydrogen	Chilling with natural gas
Reduction carbon: anthracite	Reduction carbon: carbon black residue from shell hydrogen process
Natural dead burned magnesite containing iron oxide	Sea water magnesia nearly free of iron oxide
Dust presses: piston type tableting press, one piston	Dust presses: piston type tableting press, two pistons
Sublimation retorts: 3 ft. in diameter	Sublimation retorts: 4½ ft. in diameter

References

[12] Hansgirg, U. S. Patents Nos. 2,309,643, 2,309,644 and 2,310,188.

[13] A. C. Matignon and Ch. V. Thierry, French Patent 488,735 (1915).

[14] Calloy, Ltd., French Patent 756,766 (1933).

[15] U. S. Patents Nos. 1,311,378 (1915) and 1,311,379 (1915).

[16] G. Gire and R. Fouquet, French Patent No. 733,294 (1931).

[17] Societe Generale de Magnesium, French Patent No. 800,163 (1935).

[18] Hansgirg, U. S. Patent No. 2,039,483 (Austria, 1933).

Torpedo Tubes For Surface Craft

. . . Here are shown some of the manufacturing and testing operations on torpedo tubes, made at the Naval Ordnance Plant operated in Louisville, Ky., by Westinghouse Electric & Mfg. Co.

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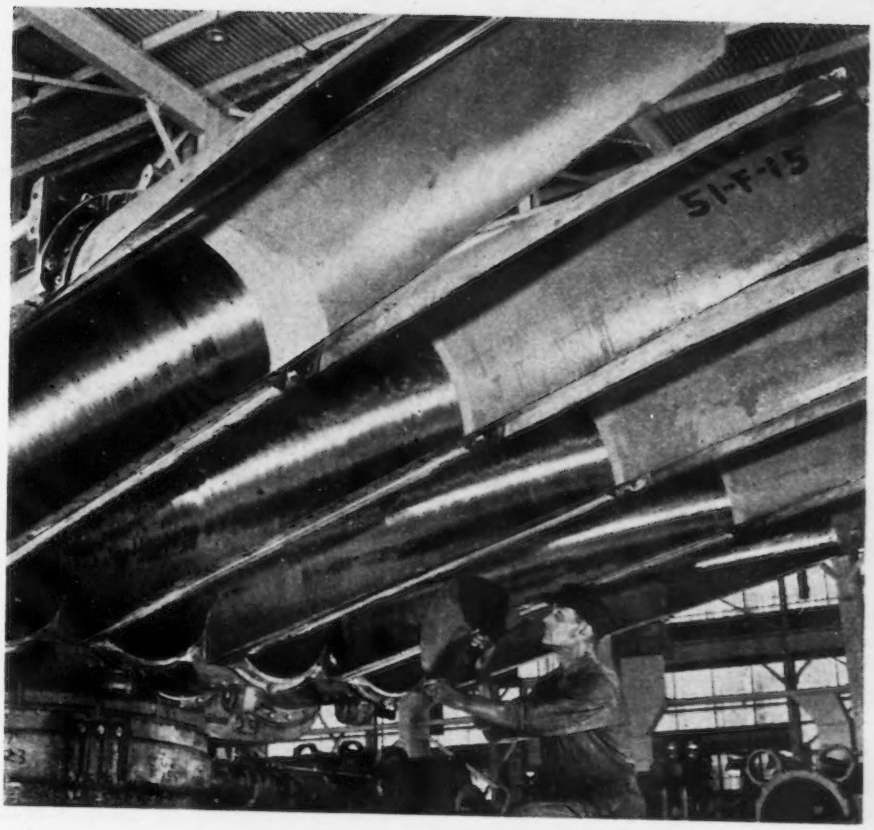


BELOW

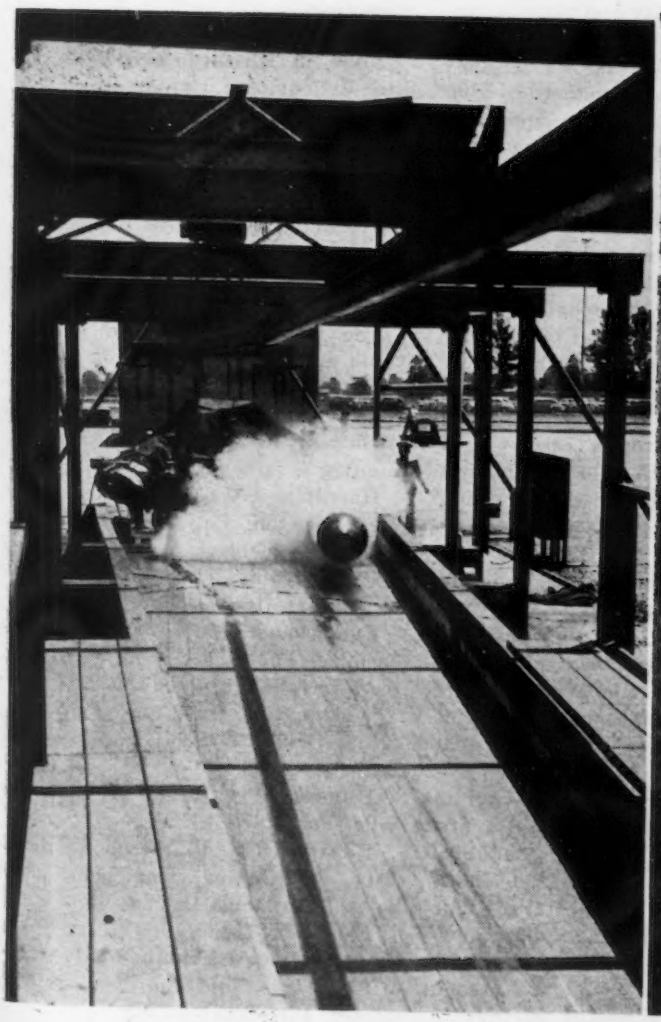
DUMMY torpedoes are fired along this wooden runway in a tube test for velocity and pressure. The torpedo, bowling along at approximately 30 miles an hr., bumps harmlessly into a hydraulic buffer at the end of the runway. The tube is concealed by a smoke cloud from the firing charge.

RIGHT

GAGING the bore of a tube spoon. Five spoons are assembled horizontally to the torpedo tube mount.

BELOW RIGHT

POLISHING the ocean side of a torpedo tube. The entire surface is brought to mirror smoothness.



Development of the American

THE tin plate industry was well established in this country by 1894. In that year the Wilson Act lowered the duty of 2.2c. a lb. on tin plate to 1.2c., but this did not deter the progress of tin plate manufacture since the industry was on a firmer foundation than a tariff schedule. The Wilson Tariff Act did, however, create enough distinction between tin and black plate duties to encourage the use of domestic black plate. Within about three years, foreign black plate ceased to enter this country.

The industry's continued growth during these years was accompanied by sharp price competition among producers despite a national demand for tin plate far in excess of productive capacity. Certain individuals lost sight of this fact and permitted their desire for particular orders or outlets to overrule their better judgment to such an extent that the market price of tin plate developed a downward trend. Prior to 1894, prices had been as follows:

Average Yearly Price
Dollars per Base Box, Bessemer Coke, 14x20, 108 lb., f.o.b., New York

1890	4.80
1891	5.34
1892	5.30
1893	5.37

From 1894 to 1897 they spiraled downward as shown below:

1894	4.89
1895	3.87
1896	3.63*
1897	3.26

**Beginning with 1896, prices were predicated on 107 lb. basis instead of 108 lb.*

American steel making had undergone a material increase in production from 1894-98 with resultant lower prices on semi-finished steel, and the price of pig tin had also dropped substantially. Although these were factors contributing to lower prices during this period, they did not justify the low levels finally reached. The worst of the "cut-throat" competition came in 1896-97, but even so, continued importation of tin plate, due to lack of enough domestic production throughout these years, prompted those with foresight to enter the field. It is appropriate at this stage that our imports and production be reviewed.

	Net Tons	
Year	Production in U.S.A.	Imports from Wales
1894	83,172	226,940
1895	127,306	253,538
1896	179,605	191,941
1897	287,389	114,604

Coincident with the success of the American tin plate industry was the depression among the Welsh producers. Skilled tin plate workers were in demand in this country, so many migrated to American tin mills. Their industrious contribution to United States' production efforts was invaluable and, combined with American mechanical ingenuity and progressiveness, aided the industry in attaining its rightful position in the nation's economic and social structure. In 1895 there were about 32 plants doing tinning only and some 37 rolling mills having a total of 159 hot mills.

Cut Nail Setbacks

The cut nail industry had flourished in the United States, but during the last decade of the nineteenth century it was fast losing ground to the wire nail product. This factor was primarily the cause of tin plate expansion in the Wheeling, W. Va., area. The Aetna-Standard Iron & Steel Co. of Bridgeport, Ohio, in 1893 was the first light gage sheet mill in the Wheeling district to add tinning equipment. At the same time, the LaBelle Iron Works of Wheeling and the Laughlin Nail Co. of Martins Ferry, Ohio, were undergoing setbacks in their cut nail business. Recognizing that some profitable substitute must be manufactured, Cecil A. Robinson, president of LaBelle Iron Works, urged his company to erect a tin mill, which got under way in 1895. The Laughlin Nail Co. broke ground in 1894 and was operating by 1895. Also in 1895, a young Wheeling concern, the Wheeling Corrugating Co., installed four stacks for tinning black plate purchased from the Whitaker Iron Co. of Wheeling, this being the second concern in the Wheeling district to produce tin and terne plate. Although not in the same district, another cut nail manufacturer who followed the Wheeling Nail Mills' lead was the Old Dominion Iron & Nail Works Co., Richmond, Va., who added tinning equipment to its rolling mill in 1894.

Even though a considerable number had begun to produce tin plate on the Eastern Seaboard, more tinning concerns dependent upon black plate from outside sources came into being in this period, namely:

Philadelphia Tin Plate Co., Nathan Trotter, proprietor—1893-94.

Meurer Brothers Co., Brooklyn—1894.

Norton Tin Plate & Can Co., Baltimore—1895. All of the company's manufacture was used in its own can making business.

Nivin & Hassard Tin Plate Co., Ltd., Philadelphia, tinning only—1895.

Reading Tin Plate Co., Reading, Pa., tinning only—1895.

Stickney Iron Co., Canton, a suburb of Baltimore, added a new rolling mill and tinning facilities in 1895.

Lalance & Grosjean Mfg. Co., Harrisburg, Pa., added a tinning plant to its rolling mill in 1895.

The Pittsburgh, western Pennsylvania and eastern Ohio area was doing a thriving business and, since "like attracts like," particularly when the locality is a suitable one, furthur building continued.

Hamilton & Co. built a plant at West Newton, Pa., in 1897 for the production of black plate for tinning.

Pennsylvania Tin Plate Co., New Kensington, Pa.—1895.

Canonsburg Iron & Steel Co., Canonsburg, Pa., added tinning facilities to their rolling mill in 1894.

Washington Steel & Tin Plate Mills; Griffith & Scott Co., Washington, Pa.—1896.

Humbert Tin Plate Co., Connellsville, Pa.—1896.

Ellwood Tin Plate Co., Ellwood City, Pa., tinning complement added to its sheet mills in 1894-95.

Ferguson Tin Plate Co., East Liberty, Pittsburgh, tinning only—1895.

Star Tin Plate Co., foot of 25th Street, Pittsburgh—1895.

Tin Plate Industry

By HOWARD A. KNOX
Assistant to Manager of Sales, Tin Plate Division, Carnegie-Illinois Steel Corp.

. . . The author continues his account of the evolution of an important industry with a description of the period of ruthless price competition as the number of plants entering this field expanded. From this practice emerged its opposite, combinations and trusts. These trusts, however, did not eliminate competition nor preclude the entrance of independent producers.

Morton Tin Plate Co., Cambridge, Ohio—1894-95.

Beaver Tin Plate Co., Lisbon, Ohio —1894-95.

Falcon Tin Plate & Sheet Co., Niles, Ohio, tinning equipment added to its rolling mill in 1895.

Crescent Sheet & Tin Plate Co., Cleveland, Ohio, although built in 1894-95, did not operate until 1896.

Alcania Tin & Terne Plate Co., Youngstown, Ohio, tinning only—1896. In 1899 the tinning stacks were removed to Avonmore, Pa., to supplement the rolling mills of the Alcania Co., also built in 1899.

American Tin Plate Machine & Mfg. Co., Canal Dover, Ohio (Reeves Iron Co.), tinning only—1896.

Dennison Rolling Mill Co., Dennison, Ohio, built in 1897, while primarily a sheet mill, produced some black plate for tinning.

Berger Mfg. Co., Canton, Ohio, tinning only—1896-98.

The Middle Western area did not have an expansion comparable to the Eastern part of the United States. Additional companies manufacturing tin plate were:

Great Western Tin Plate Co., Joliet, Ill., who installed tinning equipment to supplement its rolling mill in 1895.

Sturges & Burn Mfg. Co., Chicago, Ill., constructed tinning equipment in 1894 to produce tin plate for its own consumption in the manufacture of stampings.

The idea of fabricators producing their own raw materials was attractive, and in 1895 the Buhl Stamping Co., Detroit, manufacturers of lanterns, gas meters and milk can stock, installed tinning equipment.

James McDonald & Sons Co., Cincinnati, Ohio, tinning only—1894.

Licking Rolling Mill, Covington, Ky., added tinning equipment to its rolling mill in 1895.

Cincinnati Rolling Mill & Tin Plate Co., Cincinnati, Ohio, added tinning equipment to its rolling mill in 1897.

It is an interesting sidelight on the serious attitude of the early days in the tin plate industry to note that great confidence was placed in the various brand names of tin and terne plate by those purchasing plate. The early brands found their names in anything from Mother Nature to a city or a country. Some few brands which are typical of early tin plate companies were:

John Hamilton, Pittsburgh	Charcoal	Cokes	Ternes
	Ivy	Pink	Lulu
	Pansy		
N. & G. Taylor Co., Philadelphia	Myrtle	Almond	Willow
			Maple
Morton Tin Plate Co., Cambridge, Ohio	White Rose	Thistle	Neptune
Monongahela Tin Plate Co., Pittsburgh			Iron City
Nivin & Hassard Tin Plate Co., Ltd., Philadelphia			Sensation
			Echo

Period of Combination

It was during the years of 1890-1900 that the so-called "trusts" had their heyday. Competition in most lines of business had been ruthless. The impressive success of the Standard Oil Co. was viewed with envy by members of other industries, and other combinations began to appear. Discounting "vertical" expansion by acquiring auxiliary facilities with a view to being self-contained in the interest of lower costs, as was the case with the Carnegie Steel Co., the real trusts, or those resulting from a combination of going concerns, came into being. One of the outstanding promoters of this period was "Judge" William H. Moore who, in collaboration with his brother, James H. Moore, had had a great deal to do with the formation of the National Biscuit Co. and the Diamond Match Co. Competition among the tin plate producers was severe in 1898 and prices had declined to as low as $2.99 per base box. Costs were considered in many cases only after an order had caused its producer to lose money.

Certain individuals must have approached Judge Moore and persuaded him to exercise his talents in the tin plate industry. With his usual acumen for such a venture, Judge Moore accepted and began to make plans for a combination of companies. The nucleus was the American Tin Plate Co. at Ellwood, Ind., which was one of the most important mills in the country. The two principal individuals behind this effort were Daniel G. Reed and William B. Leeds of the company mentioned. Judge Moore is said to have had good financial backing, but it would have been a most difficult, if not impossible, task to have bought the tin plate mills of the country and paid cash. Stock in the new company was the means finally suggested to the concerns approached, and because of the fact that there was much confidence in the future of the tin plate industry, this was the procedure followed. It later developed that no one had any regrets over accepting stock instead of cash, despite the inflated prices which are supposed to have been paid for the mills. Stock to the extent of $40,000,000 was issued, $15,000,000 preferred and $25,000,000 of common. The plants were paid for in preferred stock with a bonus of 100 per cent in common. What became of the other $10,000,000 worth of common stock is a matter of conjecture.

The minutes of the first meeting of the combine, which was held on Dec. 15, 1898, at 10:30 a.m., 27 Pine Street, New York, state, "The chairman said

the principal business of the American Tin Plate Co. being the manufacturing and marketing of tin plate, terne plate, black plate, steel sheets, etc., it is essential that a corporation of the importance and as large as this one shall establish a comprehensive institution or plant adequate for the production, sale, and distribution of tin plate and other commodities to be produced by this company upon the most extensive basis, and that in this view it is obvious that no better beginning can be made than by the acquisition either by stock ownership or otherwise of the following properties:" The properties listed numbered 38 and included the following plants at the locations shown:

(1) American Tin Plate Co., Ellwood, Ind.
(2) New Castle Steel & Tin Plate Co., New Castle, Pa.
(3) Shenango Valley Steel Co., New Castle, Pa.
(4) Monongahela Tin Plate Co., Pittsburgh.
(5) United States Iron & Tin Plate Mfg. Co., Demmler, Pa.
(6) National Tin Plate Co. of Pennsylvania, Monessen, Pa.
(7) Pittsburgh Tin Plate Works, New Kensington, Pa.
(8) Pennsylvania Tin Plate Co., New Kensington, Pa.
(9) Star Tin Plate Co., Pittsburgh.
(10) Humbert Tin Plate Co., Connellsville, Pa.
(11) Washington Steel & Tin Plate Mills, Washington, Pa.
(12) Crescent Sheet & Tin Plate Co., Cleveland.
(13) Falcon Tin Plate & Sheet Co., Niles, Ohio.
(14) Beaver Tin Plate Co., Lisbon, Ohio.
(15) National Tin Plate Co., Anderson, Ind.
(16) Irondale Steel & Iron Co., Middletown, Ind.
(17) LaBelle Iron Works, Wheeling, W. Va.
(18) Wallace Banfield & Co., Irondale, Ohio.
(19) Aetna Standard Iron & Steel Co., Bridgeport, Ohio.
(20) Atlanta Steel & Tin Plate Co., Atlanta.
(21) Baltimore Tin Plate Co., Baltimore.
(22) Blairsville Rolling Mill & Tin Plate Co., Blairsville, Pa.
(23) Cincinnati Rolling Mill & Tin Plate Co., Cincinnati.
(24) Great Western Tin Plate Co., Joliet, Ill.
(25) Ellwood Tin Plate Co., Ellwood City, Pa.
(26) Johnstown Tin Plate Co., Johnstown, Pa.
(27) Laughlin Nail Co., Martins Ferry, Ohio.
(28) Morewood Co., Gas City, Ind.
(29) Neshannock Sheet & Tin Plate Co., New Castle, Pa.
(30) Ohio River Sheet & Tin Plate Co., Rochester, Pa.
(31) Hamilton & Co., West Newton, Pa.
(32) Marshall Brothers & Co., Philadelphia.
(33) Britton Rolling Mill Co., Cleveland.
(34) Cumberland Steel & Tin Plate Co., Cumberland, Md.
(35) Reeves Iron Co., Canal Dover, Ohio.
(36) Somers Brothers, Brooklyn.
(37) Canonsburg Iron & Steel Co., Canonsburg, Pa.
(38) Stickney Iron Co., Baltimore.

The directors elected at this meeting were Daniel G. Reid, William B. Leeds, William H. Moore, W. T. Graham, James H. Moore, James B. Dill, Warner Arms, Frederick S. Wheeler, George Greer, James McLean, William H. Donner, Cecil A. Robinson, William E. Reis, Richard R. Quay and James A. Mathews. Officers elected were: Daniel G. Reid, president; William B. Leeds, first vice-president; W. T. Graham, second vice-president; William F. Dutton, secretary; William P. Beaver, auditor, and Frederick S. Wheeler, treasurer.

It is also revealed in the minutes of this meeting that the rights to the Letters Patent held by Norton Brothers of Chicago were to be acquired. These patents covered the Norton Automatic System of tinning iron or steel sheets for the manufacture of tin plate. Taliaferro's process of reducing tin oxide to metallic tin was also included in the process. The gentlemen mentioned were apparently assuming every possible measure of control. There were some few mills and tinning establishments that were coveted but preferred to stay independent of the combine. The most prominent of these were the Wheeling Corrugating Co. and the Whitaker Iron Co., later to be the Whitaker-Glessner Co., and finally a part of the Wheeling Steel Corp. This transaction would have been a complex one since the hot mills were an integral part of the Whitaker Sheet Mill and the tinning units were in the plant proper of the Wheeling Corrugating Co.

On Dec. 16, the directors met in the office of the American Tin Plate Co. in Chicago and decided that all mills having orders and supplies were to commence work Dec. 19, 1898. Instructions were issued that all new orders be sent to the general office in Chicago. The handling of such a complex task as this would have likely taxed even the most able of present day steel procedure men. This group, however, was not faced with any worries over maintaining their competitive position while orders and contracts were being untangled, personnel matters settled and operations adjusted. Considering the lack of mechanical office and accounting equipment at that time, first-hand narratives on this period from some of those participating indicate that an overall satisfactory job was accomplished.

Greater Efficiency Sought

Once organized, this new company promptly set about to accomplish a number of objectives. Some of the plants acquired were very inefficient and poorly located. These were dismantled and every possible angle for greater operating efficiency was exploited, and the benefits are alleged to have been considerable. Prior to the production of tin plate in this country, sales of plate were handled for the Welsh by brokers. It was only natural that for a time these brokers would represent the tin plate companies of this country, and this was generally the case until the American Tin Plate Co. recognized that it could do a better job with less expense through its sales offices in Chicago and New York. Many of the brokers formerly sold the tin plate to the packers, most of whom made their own cans and then sold the packaged food for the canner, collecting a commission on both transactions.

In 1897 the Dingley Tariff raised the duty on tin plate from 1.2 c. a lb. to 1.5 c. While this charge had been nominal prior to the "combination," it proved to be convenient for the American Tin Plate Co., who raised the price in 1899 to an average yearly rate of $4.41 per base box,* reaching an average of $4.82 per base box in 1900. A number of the mills acquired in the combine had contracts for 1899 based on considerably lower rates than those being currently charged. It is reported that some of these contracts were of a "requirement" nature, giving the buyer the right to buy up to whatever might be decided upon as his requirement. This feature must have prompted some interesting and, very likely, heated discussions.

**In 1899 quotations were on a 100-lb. basis.*

Earlier in 1898, Elbert H. Gary and J. P. Morgan had formed the Federal Steel Co., composed of "heavy product" mills. This combine was a rather formidable factor at that time, as was Andrew Carnegie's Carnegie Steel Co., Ltd. With the American tin plate industry having developed substantially, the sheet bar tonnage involved seemed to necessitate that the American Tin Plate Co. become self-sufficient in that respect, although semi-finished steel producers by no means possessed a monopoly. Either or both of the Carnegie and Gary companies were too much for even the

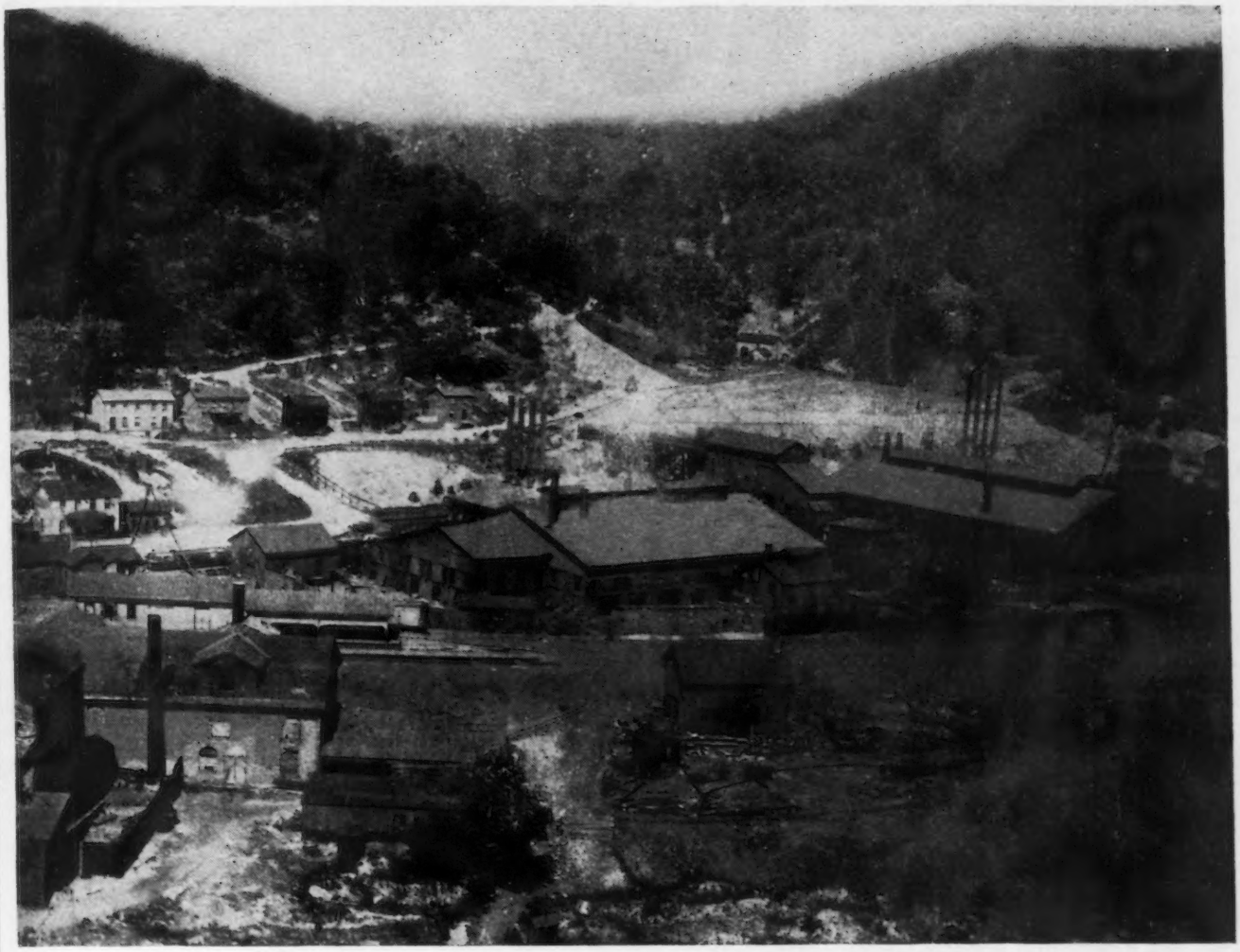


FIG. 3—The Wallace Banfield Co., Irondale, Ohio, was one of the first American sheet steel producers to install tinning equipment in 1891 after the McKinley Tariff Act became operative. This photograph was taken about 1894. (Courtesy of Harry E. Duff, Carnegie-Illinois Steel Corp., retired.)

best ambitions and talents of Judge Moore and his associates, so a number of unattached steel works and bar mills were acquired by the same group involved in the American Tin Plate Co., to form the National Steel Co. in 1899.

The Carnegie Steel Co., organized in 1900, was not a merger of competing units but rather a union of the interests of Andrew Carnegie and H. C. Frick with certain other companies which had been related in their operations. Most of Carnegie's output was in structural steel and rails but a considerable tonnage was in the form of semi-finished material. By this time, many of their finishing mill customers had entered various mergers. The Morgan interests were behind the National Tube Co., which concern needed more steel works and skelp mills to be self-sufficient. After much thought and discussion on both sides, Andrew Carnegie sold his interests to J. P. Morgan, who already possessed the formidable Federal Steel Co. Elbert H. Gary, the president of the latter company, is reported to have been advocating such a merger even on a greater scale and to include the following companies:

American Bridge Co.
American Steel Hoop Co.
American Steel & Wire Co.
American Tin Plate Co.
American Sheet Steel Co.
Federal Steel Co.
National Steel Co.
Lake Superior Consolidated Iron Mines.
Carnegie Steel Co.
National Tube Co.

Feb. 25, 1901, is the date that this sizable venture was chartered as the United States Steel Corp. with a capitalization of $1,100,000,000 in stock and $304,000,000 in bonds. The American Tin Plate Co. and its semi-finished associate, the National Steel Co., were now part of an organization which had, and recognized, its tremendous responsibilities. A considerable portion of the nation's steel-making capacity was in the hands of a group of responsible individuals who realized that only ethics of an unassailable nature could bring success to a concern of such magnitude.

The fact that the American Tin Plate Co. was a part of United States Steel Corp. by no means eliminated competition, as was soon evidenced by the entry of others into the tin plate business. The policy was to live by securing fair prices for tin plate and to let others live as well. Furthermore, the Corporation had semi-finished capacity in excess of that needed for its own finishing mills. At a meeting of the directors of the American Tin Plate Co. on Oct. 21, 1901, Messrs. E. H. Gary and C. M. Schwab were elected to the board, and W. T. Graham assumed the presidency of the company. The advent of many independent tin plate companies, following United States Steel Corp.'s acquisition of the American Tin Plate Co. in 1901, is testimony to its policy not to retard others in a like business

and to encourage outlets for semi-finished steel.

The outstanding event of 1903 was the combination, on Dec. 15, of United States Steel Corp.'s sheet and tin plate subsidiaries, the American Tin Plate Co. and the American Sheet Steel Co., to form the American Sheet & Tin Plate Co. This move was primarily to secure greater efficiency and distribution through combining the management and operations of the two companies. W. T. Graham, who originally came from the Aetna-Standard Steel & Iron Co., Bridgeport, Ohio, and subsequently served as president of the American Tin Plate Co., was appointed to the presidency of the new company. In later years Mr. Graham became president of the American Can Co. Capacity of the American Sheet & Tin Plate Co. at that time is reported to have been about 232,000 base boxes per week for 19 tin and terne plate plants.

Perfection of Double Seam Can

It was during this particular period that the combined efforts of the Max Ams Preserving Co., equipment manufacturers, Bogle & Scott, brokers, and the Cobb Preserving Co. in Fairport, N. Y., resulted in the perfection of the double-seamed or sanitary can instead of the old "hole and cap" type. Many food products were just waiting for such a container, and this innovation did much to hasten the use of more tin plate by the canners. By this time, the can making business was being gradually divorced from the food packer, as it was apparent that specialization had a most natural place in this field.

In 1899, the "big three," D. G. Reid, William B. Leeds and Judge William H. Moore, who had attained national fame in forming the American Tin Plate Co., saw an opportunity to amalgamate the tin can companies of America. Over 100 companies were combined as the American Can Co. in 1901. Edward Norton, who had been head of the Norton can interests, was placed in the presidency of the organization. In 1904, due largely to the efforts of Mr. Norton, who had retired from the American Can Co. a few years before, the Continental Can Co. was formed. A pooling of management and equipment into fewer can companies made for the betterment of the can industry. Then, as now, as the can business progresses, so does the tin plate industry.

The colorful nineties saw many happenings in America's industrial life and the turn of the century held much hope for individuals of enterprise and initiative. During the

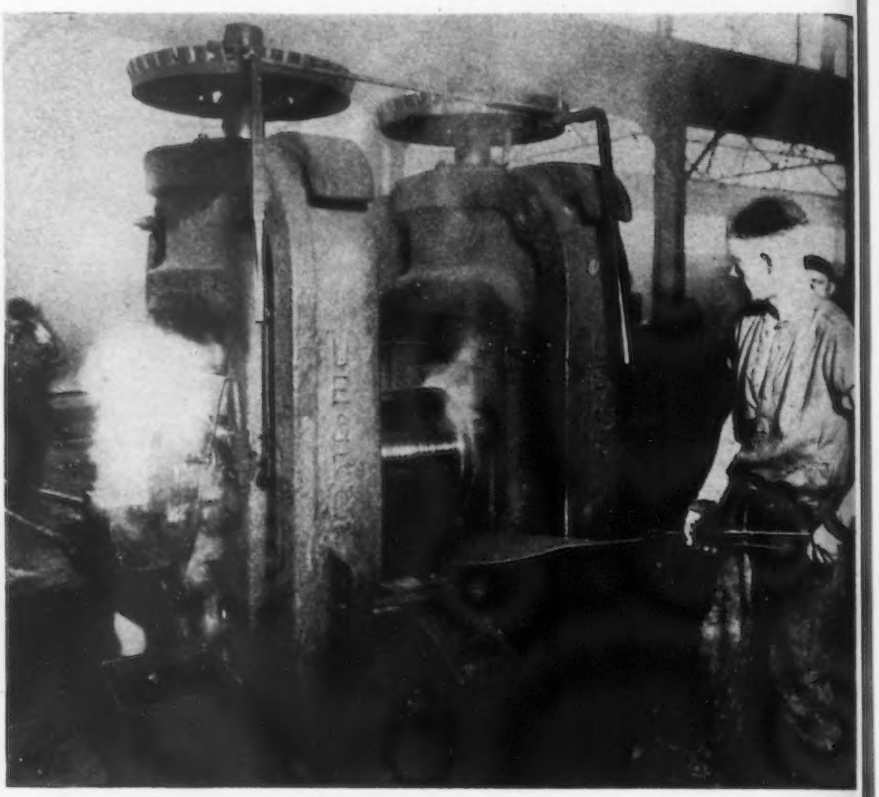


FIG. 4—Hot rolling black plate for tinning was employed for about 200 years and while improvements were effected during this time, it was not until 1929 that basic changes were made in the production of black plate with the advent of the cold reduction process.

period 1898-1907 many tin plate companies came into existence. E. T. Weir laid the foundation for his National Steel Corp. by entering the tin plate business. E. R. Crawford, in later years an outstanding character of the industry, formed the McKeesport Tin Plate Co. The merger of 1898 and the rumblings of further consolidation did not disturb nor retard those who were interested in tin plate. With the exception of a few companies, most of the expansion now was in the Pittsburgh, western Pennsylvania, and eastern Ohio sections, for example:

Johnstown Tin Plate Co., Johnstown, Pa.—1898.

Neshannock Sheet & Tin Plate Co., New Castle, Pa.—1898.

Shenango Valley Steel Co., New Castle, Pa.—1899. This plant became one of the outstanding large mills of the industry, being the Shenango Works of the American Tin Plate Co., the American Sheet & Tin Plate Co., and later the Carnegie-Illinois Steel Corp.

Chester Rolling Mill Co., Chester, W. Va., was built in 1899-1900.

Washington Charcoal Iron Tin Mills, Washington, Pa.—1899-1900. Later known as the McClure Co. in 1905, and the Washington Tin Plate Co. in 1907.

Sharon Tin Plate Co., Sharon, Pa. —1901-1902. Later operated by the American Sheet & Tin Plate Co.

Anchor Mills, Neal Brothers, 19th St., South Side, Pittsburgh, added tinning equipment to their rolling mill in 1900.

Carnahan Tin Plate & Sheet Co., Canton, Ohio—1901. Later the Falcon Tin Plate Co. in 1922, in 1930 the Canton Tin Plate Co., and finally the Republic Steel Corp. in 1936.

Griffiths Charcoal Iron Mills, Washington, Pa.—1901-2.

Jackson Iron & Tin Plate Company, Clarksburg, W. Va.—1901-2. This company was destined to be the beginning of the Weirton Steel Co. subsidiary of the National Steel Corp. It became the Phillips Sheet & Tin Plate Co. in 1905, which later changed its name to the Weirton Steel Co. in 1918. The Weirton plant was not erected, however, until 1909-10.

Pope Tin Plate Co., Steubenville, Ohio—1901-2. This plant was started by Charles Pope of Pittsburgh, who had been sales agent for the LaBelle Iron Works, Wheeling, W. Va. The plant was sold to the Phillips Sheet & Tin Plate Co., nucleus of Weirton Steel Co., in 1912.

McKeesport Tin Plate Co., Port Vue, McKeesport, Pa.—1902-3.

Rolling Mill Co. of America, Sabra-

ton, W. Va., started to build a six-mill plant in 1902 which was only partially completed when taken over by the Morgantown Tin Plate Co. in 1903-4, who never operated the plant but sold it to the American Sheet & Tin Plate Co.

Sable Iron Works, Zug & Co., Ltd., Pittsburgh, produced black plate only —1904.

Follansbee Brothers Co., Follansbee, W. Va.—1902-4. Formerly James B. Scott & Co., Allegheny City, Pa.

Standard Tin Plate Co., Canonsburg, Pa.—1903-4. This company was acquired by the Continental Can Co. in 1909, the entire output being used for its can factories.

MIDDLE WESTERN AREA: Juniata Steel & Iron Co., Greencastle, Ind.—1902-3. Later the Western Tin Plate & Sheet Co. (1905).

Colorado Fuel & Iron Co., Pueblo, Colo., construction begun in 1902 but was never completed. Pueblo would not have been a very logical location.

A plant was erected at this time that must have been a continual source of both expectation and discouragement to its workmen as well as to the citizenry of Marietta, Ohio, for it experienced repeated change of ownership and was expected to start operating at intermittent periods. From its early days until finally abandoned, it was idle during the greatest part of this period. This was the Marietta Sheet & Tin Plate Co., Marietta, Ohio—1902-3, later to be the United Sheet & Tin Plate Co. in 1904 and still later to be acquired by the Union Sheet & Tin Plate Co. in 1909, the Pittsburgh Sheet & Tin Plate Co., the Pittsburgh Tin Plate & Steel Corp. in 1919, and finally the W. F. Robertson Sheet & Iron Company in 1928. The original owners also built a sheet mill at Newcomerstown, Ohio, in 1901-2 where some black plate was produced but this, too, was destined to soon close.

The Atlanta Rolling Mill & Tin Plate Co. was added to the Indiana group, 1903-04, producing black plate for tinning. When partly built, it was acquired by the Atlanta Tin Plate & Sheet Mill in 1906.

Waukesha Sheet Steel Co., Waukesha, Wis., black plate only—1901.

EASTERN AREA: Plymouth Rolling Mills, Conshohocken, Pa.—1901, later to become the Stanford Rolling Mills.

It is of particular interest that during this period the newly formed American Can Co., now, normally, the world's largest buyer of steel, primarily tin plate, was operating three tinning plants, those formerly owned by the Norton Can interests, which were merged with the American Can Co. in 1901. These properties were at Baltimore, producing about 10,000 base boxes weekly; Whitestone, L. I., N. Y., to the extent of 780 base boxes weekly, and at Maywood, Ill., about 11,000 base boxes per week.

This period of combination, domination, expansion and development saw much activity as is well testified by the above statistics.

In November, 1901, there were 55 completed tin plate mills, seven being built, and one projected. By June, 1904, 53 are recorded as completed, two being built and one projected, and some 22 units were tin or terne coating only. This shows a total mortality of seven since uneconomical and dislocated units were feeling the effect of sound economics. In November, 1907, the total number of tin mills was 43, of which 20 were tinning or terne coating only.

Year	Production of Tin Plate in the United States (Net Tons)	Imports from Wales (Net Tons)	Average Yearly Price, F.O.B. New York, Per Base Box (Dollars)
1898	366,145	85,436	2.99
1899	404,180	53,916	4.41
1900	425,002	73,661	4.82
1901	447,206	58,415	4.35
1902	403,200	98,616	4.28
1903	537,600	54,803	4.09
1904	516,470	63,252	3.76
1905	552,720	80,414	3.85
1906	646,870	60,314	4.04
1907	576,549	71,137	4.25

Ed. Note—The author concludes next week with an account of the industry's accomplishments in two wars and the development of the cold reducing process and electrolytic tinning.

Basic Cupola Process for Desulphurization

TESTS with a 27-in. cupola in which a basic lining was substituted for the usual acid refractory in order to increase the basicity of the slag and use it for desulphurizing instead of resorting to the soda ash process are described by E. S. Renshaw in the *Foundry Trade Journal.*

Dolomite bricks 1 in. thick were placed against the shell, followed by 3½ in. of rammed stabilized dolomite cement mixed with 6 per cent of water and 1 per cent of sodium silicate. The lining was first air dried and then heated with a gas flame, the temperature being increased to 750 deg. F. in 10 hr. For repairs to the melting zone, a patching cement was prepared by grinding stabilized dolomite clinker to a finer grading than the ramming material. The patching cement was milled with about 12 per cent of water. This had to be applied immediately after mixing as it has air setting properties.

A continuous tapping box through which both slag and metal passed was rammed with the same material. The box had a teapot spout for the metal and a slag notch at the side. In operation, the cupola well carried a relatively large volume of slag with a minimum quantity of metal.

The coke bed was 42 in. above the top tuyeres. The coke analysis was: Fixed carbon 90 per cent; sulphur 0.90 per cent; ash 9.5 per cent, and volatile matter 0.50 per cent. The flux consisted of limestone and fluorspar, the latter to make the slag fluid enough to flow over the slag notch.

In the experimental melts the proportion of steel charged was progressively increased to 100 per cent. With a charge of 100 per cent gray iron scrap, the sulphur in the charge was 0.12 per cent, and in the metal tapped this was reduced to 0.056 per cent. In the remaining melts with increasing steel and representative of mixtures suitable for making low carbon irons, malleable iron and Tropenas converter steel, the desulphurization was sufficient to obviate any after treatment with soda ash.

The trials having been successful, a 36-in. cupola was lined with the same material. The continuous tapping system was employed, the metal flowing into an electric furnace the inlet of which was only 4 ft. from the cupola tapping hole. Over 3000 tons of metal have been melted in this cupola, but figures on the consumption of refractory material are not yet available.

Post-War Russia, a Market for A

. . . When the time comes for the Soviet Union to rebuild and expand its basic industries, it will turn to the United States for equipment and technical help, according to the author. In this article he explains Russia's future needs with respect to foreign trade.

HISTORIC experience has shown that the United States and Russia, despite their antagonism in political ideas, have always opposed the dismemberment of the other and each have always wished the other to be strong.

The destiny of both countries is therefore common, not only by political reasons but also by natural sense; both countries are great in space, rich in natural resources, the people of both countries have a bright and wide minded sense for industrial developments and progress. The ambition of the Soviet Union for the last 20 years has been to develop its resources in the same way that America has been explored, and to bring its people up to the American standard of life.

Russia will make all efforts after this war to rebuild its destroyed country on a scale never seen before. It is certain that the Soviets will no longer depend for supplies or technical help on Germany's industrial potence.

To whom else than to America will Russia look for technical help, supplies and new industrial equipment. There should be no fear that the Russians will follow the steps of the treacherous Japs, for which trade with America was only the school and springboard for their engineers and spys, and every industrial purchase in America being made always with the thought to steal ideas, patents and new achievements, to utilize them later in Japan.

The quantities of supplies that Russia is now receiving through lend-lease brings it closer to American technique and makes its technicians familiar with American equipment and machinery.

The Soviet Union has built up in the last two decades a new powerful industry of its own and still remained a large consumer of industrial goods of all kinds. With its rising standard of life, these demands will increase steadily, resulting in new markets and more buying power there.

What is the outlook for the American iron, steel and machine industry in the U.S.S.R. after this war?

Soviet steel production in 1939 was approximately 22 million gross tons. Not included in these figures is the output of the special Russian armament plants as their production has been kept secret but it can be assumed that 4 million gross tons of steel including high alloy steels, can be added; thus, there was a total steel production of 26 million tons in 1939.

Fifty to 60 per cent of this material was produced in European Russia, that is the Southern Ukrainia, in the Don Basin, on the Azov Sea (Mariupol, Kerch, Taganrog) in the Central region around Stalingrad, Voronezh, Tula, and Moscow, and finally in the region of Leningrad (Krassnyj Putilovetz, former Putiloff Works) and Izorsky Vavod (the only plant in Russia similar to Midvale and Bethlehem producing heavy armor).

Many Plants Destroyed

Around its blast furnaces, steel plants, coal and coke production centers, the largest machine building factories for locomotives, diesels, steam turbines, tractors, electric equipment plants, etc., were located. Most of these plants have been in one or other way completely destroyed and despite all evacuation efforts of the Soviet Government to remove these plants in or beyond the Urals, and to Siberia, it is safe to assume that 50 per cent of Russia's coal and coke production, 70 per cent of its iron ore production (Krivoy-Rog, Kerch), approximately 60 per cent of the iron and steel production including steel alloys and 40 to 50 per cent of the whole machine building capacity has been destroyed. If the destruction in special lines is counted, these figures rise to 75 to 80 per cent, as for locomotives, rolling stock, steam and hydraulic turbines, steam boilers, electric machinery and power stations, tractors, road building, transport machinery, etc.

On lend-lease up to date, approximately one hundred million dollars of actual industrial equipment consisting mostly of hydraulic presses of all kinds, mechanical and tool machinery, rolling mill equipment, oil refining and electric industrial products have been shipped to Russia. A part of this equipment is not yet utilized due to shipping and transport difficulties. (Straight war material of all kinds, food and medical supplies, etc., have not been included in the above figures.)

Russia's effort after peace will be to restore its transportation system, to rebuild the damaged electric and water power stations and with this, as in 1922 and during the first Five Year Plan between 1925-1929, to lay the foundation for the rebuilding of the country. However, all this will be done on a much larger scale.

During this rebuilding period the U.S.S.R. will have to import in large quantities, as in the period from 1922-1929, steel products such as hot and cold rolled steel, rails, tires, wheels, axles, plates for boilers and shipbuilding, cold rolled plates and strips for the automotive industry; wire, tubes (of Russia's six large tube mills, three have been completely destroyed: Mariupol, Dniepropetrovsk and Stalino), steel alloys and tool steel. About 2500 to 3000 locomotives have been built in Russia annually during 1936 to 1939, of which two thousand were built in Voroshilovgrad and in Krasnyj Profintern at Briansk. These two most important Russian locomotive plants have been completely destroyed. The remaining two locomotive plants at Kolomna (near Moscow) and Ulan-Ude, Soviet Mongolia, can hardly supply one-quarter of Russia's critical need for locomotives. The lend-lease locomotives which Russia is now receiving will only cover the most critical demands for the immediate war effort, Russia's need for locomotives, rolling stock, railroad equipment and maintenance to keep

American Industries

By ADOLPH G. HOCHBAUM
Baldwin Locomotive Works, Philadelphia

its transportation rolling and repair shops working, will be great.

The demand will be no less great for steam boilers, steam turbines of all purposes, diesel engines for power and pipe lines, pumps, compressors, electric motors, generators and control instruments, cranes, road building, transport machinery, etc.

Together with the above, the demand for new industrial equipment such as presses of all types for machine building, metal and aircraft industry, rolling mill equipment, new industrial equipment for oil refining and chemical industry, plastics, plywood, etc., furnace and heating equipment, machine tool and apparatus, etc., will have a big share in United States exports to Russia.

A victorious Russia after this war will be economically stronger and better consolidated than in the first years of the Soviet regime, and there is every reason to believe that the social order there will be strengthened. The foreign trade will without question remain a government monopoly, as this is one of the basic principles of the Soviets. In exporting to Russia, the United States will have, as before, to deal with the Soviet Government agencies. The question of how to finance these exports will be much simpler than it appears at the present time.

The foresight of the Czechoslovakian industry, supported by their bankers, made it possible to build during 1922-1925 the first large electric power stations around Moscow, Leningrad, Kharkov (Shatura, Kashira, Krasnyj Oktjsbr-Leningrad, Shterovka, Nigres, etc.), against partial payments extended up to seven years. In the footsteps of Czechoslovakia, Germany and England followed with large industrial deliveries to the Soviets on credit. Those interested in trade with Russia know that all investments were paid back in full, in time, and with interest.

The Government of the United States has often declared that its policy is and will be a cordial understanding in political and economic matters with Russia, not only as Allies during the war but also for the future. Good will on both sides will bring both great nations in friendly and good economic relations together for the benefit of the United States and the Soviet Union.

Invisible Ink Identifies Employees

A UNIQUE and positive method of identifying employees who work in war production plants has been developed by Sun-Kraft, Inc., Chicago, manufacturers of ultra-violet ray equipment. Each employee has one of his hands marked with secret, semi-permanent, invisible chemical ink that cannot be washed off. The symbol used is known only to guards in the plant's protective organization.

If, when entering the plant, an employee has lost his identification badge or the usual means of identification are not entirely satisfactory, his hand is placed through an opening in a black curtain where special ultra-violet ray equipment is located. Immediately the chemical ink glows, revealing the invisible symbol which the guard checks against the company's records.

The quartz ultra-violet ray investigation lamp used is equipped with a red-purple filter which intercepts all visible light and only transmits ultra-violet rays of a specific wave length. When this so-called "black light" is concentrated on the chemically-applied symbol, it activates the chemicals to a highly intense fluorescent glow.

The symbol can be removed with other chemicals, also secret. None of the chemicals is injurious.

Rubber Dies for Small Presses

. . . The economies of tooling equipment made possible by the rubber die principle of processing, has hitherto been regarded as dependent on the use of a large hydraulic press. Herein, the author, A. Bernard, describes the use of a bench-type machine in the blanking and forming of small parts, the results being very promising for this mode of production.

THE economies in tooling equipment made possible by the adoption of the rubber die principle of processing are well known and need no emphasis.* Hitherto, however, the attainment of these benefits has been regarded as being dependent upon the possession of, or the ability to obtain, a large hydraulic press, a condition beyond the means and capacity of many small firms. It has been generally accepted that high pressures are needed for blanking and forming with the rubber pad, and the use of small presses of the bench type for such work has not been seriously considered.

**For articles showing use of rubber dies in forming and blanking of large parts, see* THE IRON AGE, *issues of May 28, June 4, 11, and 18, Aug. 27 and Oct. 1, 1942.*

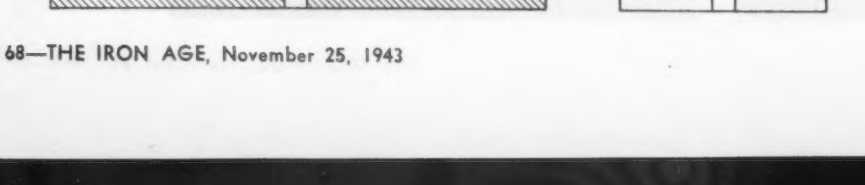
Although necessarily incomplete, the following notes from *Aircraft Production* are of interest, as they represent the results of the writer's experiments over a considerable period with small fly-presses on both blanking and forming operations. From the results obtained it would appear that the application of the process to such machines is well worth consideration.

Hand Press Tools

The tools used for these experiments are illustrated diagrammatically in Fig. 1. To hold the rubber pad, a box container is employed in which the ends are ⅜ in. shorter than the sides. This arrangement is adopted to permit the rubber to flow out under compression. The sides of the bottom-tool bolster fit inside the box container, but at the ends the bolster is much longer than the box. This extension provides a flat bed for the strip as it is fed through the tool and against which it is pressed firmly by the rubber. It also prevents buckling of the strip at the ends, which was found to be one of the results of using a totally enclosed box.

When the ram is brought down the rubber strikes the strip on the surface of the template and bends it over. As the ends of the top tool are ⅜ in. shorter than the sides, the rubber flows out at the ends under compression. The component always begins to shear at the ends where the rubber has some movement and can exert greater pressure against the template.

FIG. 1—Arrangement of the type of tool used for blanking with a rubber pad on a hand press.



Actually this pressure is exerted below the cutting edge. Because the sides are totally enclosed the rubber has less movement and does not start to shear the strip until the ends have parted. Inside the box the rubber is still moving very slightly and starts to roll from the direction of the sheared ends in the radius formed between the template and the bottom tool imparting the shearing action.

Assuming that the strip is fairly narrow, with an allowance of ¼ in. on either side of the template, the strip would not be sheared. There would not be sufficient material for the rubber to grip to build up pressure against the side of the template to form the radius. It would simply form a flange on either side of the template.

For use in a hand press, a blanking template requires to be 3/16 in. thick, and to have 10 deg. of shear for the side to give movement for the rubber. A sharp cutting edge to the template is, of course, essential. Strip with an allowance of ½ in. of material each side of the template is most suitable, when using duralumin or Alclad. This may be slightly less for aluminum of a thickness up to 22 S.W.G.

The reason for the allowance of ½ in. of material is that when the top tool is brought down in contact with the bottom bolster, the strip bends over and forms a flange round the blanking template, which must be gripped by the rubber. As the template is 3/16 in. thick, the length of the bend would be approximately 0.294 in., leaving 0.206 in. excess material, which is held flat by the rubber, on the face of the bottom bolster. For example:

> ½ in. surplus either side of the template equals 0.5 in. minus length of bend formed which gives 0.294 in., leaving 0.206 in. excess material to be gripped by rubber.

Assuming that the strip is cut fairly narrow, say with an allowance

of ¼ in. either side of the template, the strip would not be sheared, as there would not be sufficient material for rubber to grip against the face of bolster.

¼ in. surplus either side of the template equals 0.250 in., minus length of bend to be formed which equals 0.294 in. 0.250 in. minus 0.294 in. equals 0.044 in.

In this case the radius is not formed to give the required length of bend, and there is no material held flat on the face of the bottom bolster for the rubber to grip, so that it can develop its shearing action. When making templates, and cutting strip for use in this type of tool, this point should be borne in mind.

When a hydraulic press is used, pressure is gradually built up; that is, there is no pressure exerted until two faces meet. Rubber takes longer to build up pressure, as it is gradually moving in its displacement round the template. Consequently, there is no power in the blow to make the rubber move quickly to start the shearing of the material.

Rubber Pad Action

With a fast-action press and the type of tool described, the full pressure is brought immediately into action when the rubber strikes the template and a greater amount of rubber is forced out at the ends to assist in the start of the shearing. There is also a partial blanking movement, that is, the speed of blow in relation to the pressure impresses a line all round the template on the strip. This can be seen, if when the ram has descended, there is insufficient tonnage to shear the strip.

Hard rubber is most suitable for shearing, as the template does not then cut into the rubber face and the pad does not give way as when a soft grade when shearing action takes place. Soft rubber flows more readily and is, therefore, most suitable for bending or flanging. An intermediate hardness can be used, but soon starts to disintegrate at the ends when the rubber flows out at the ends of the box. After a few components have been cut out it loses its power to shear and parts into three different sections.

In using a handpress the size of component is obviously limited. Aluminium of 18 S.W.G. in thickness can be processed quite satisfactorily. Duralumin or Alclad requires the usual normalizing treatment before working, otherwise it will not bend over the template. Small pieces can be produced in 20 S.W.G. material and medium-sized blanks in thickness from 26 up to 22 gage, including the piercing of holes.

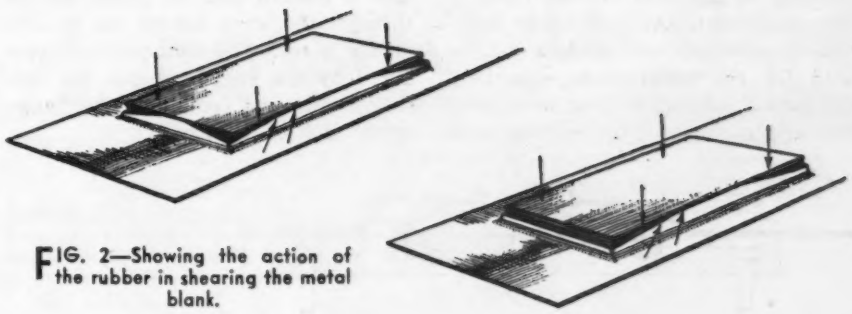


FIG. 2—Showing the action of the rubber in shearing the metal blank.

Piercing Holes

It is quite easy to shear holes from ¾-in. diameter simultaneously with the outside profile, but it is important that the template should be hardened and flat on the upper surface, which should preferably have a ground finish. Hardened, 3/16-in. ground flat stock is the most suitable for making templates.

It is not necesary to fit an ejection pad for removing the ¾-in. diameter slug, as the vacuum formed by the rubber causes it to stick to the rubber. It must be remembered when moving the strip through, and removed before the next descent of the ram. If french chalk is used on the pad the slug will come out from the hole and fall on the face of the component and can be pushed out with it.

An advantage of normalizing duralumin or Alclad is that when short runs of about 25 off are being put through, it is a simple matter to change the top box of hard rubber to one of soft rubber, and complete the operation of flanging or forming before the material age-hardens. For shearing the outside profile and producing holes for ¾-in. diameter upwards the template is secured to the bottom tool by screws. These must on no account break through the upper surface of the template. The same rubber box and bottom bolster can be used for any component provided that standard hole centers are used on all templates and bottom bolsters.

For shearing outside profiles and piercing holes from 3/32-in. diameter simultaneously, the punches require to be spring-loaded to strip themselves from the component. In such cases the template is mounted on a piece of ½-in. mild steel or boiler plate, counterbored to hold the springs and punches, which are retained in position by the template.

As the top tool descends, the strip is gripped by the rubber on the face of the template, which is forced down. This action exposes the punches which pierce the strip, while the outside profile is sheared at the end of the stroke. On the return of the ram the template comes back to its original position, and the component can be removed from the face of the template. The slugs or piercings remain on the face of the component and are removed at the same time as the component.

Another method of piercing and shearing is to spring-load the template and mount the punches in the boiler plate. A fairly large-section spring is required in this case to keep an even pressure under the template. With the former method and where the pitch of the hole is fairly even and well spaced, small springs are used.

Punches can be mounted on a small punchholder or independently de-

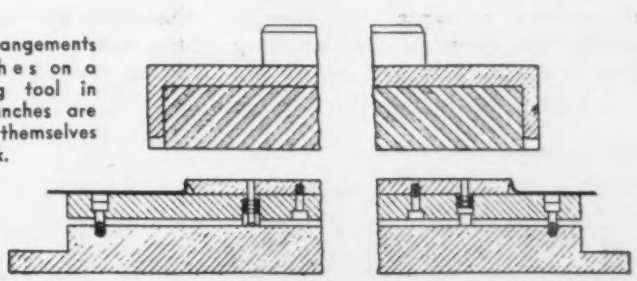


FIG. 3—Alternative arrangements of mounting punches on a blanking and piercing tool in which the piercing punches are spring-loaded to strip themselves from the blank.

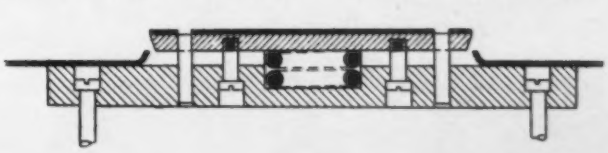


FIG. 4—Another type of blanking and piercing tool in which the blanking template is spring loaded.

pending on the pitch on the holes in the component. As previously mentioned, standard hole centers can be used for the boiler plate, template, and botom bolster, so that on rubber box and bottom bolster can be used for different components. Piercing punches can be made standard, as the majority of holes in small components are used for rivets 3/32 in., ⅛ in. and 3/16 in. in diameter. This makes it possible to divide the complete tool into standard fittings—sub-bolster or boiler plate and punches, which can be made in quantity and drawn from store when required. The bottom bolster and rubber box are universal.

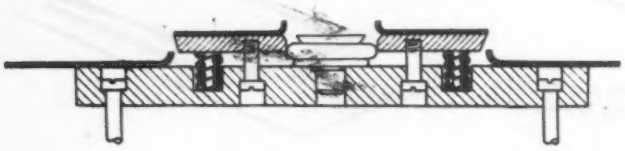


FIG. 5—A blanking tool combined with a piercing and flanging punch for a lightening hole.

Pierced holes are slightly drawsunk, which may be used to an advantage when riveting. To flatten these, if required, the component can be placed on the face of the bottom bolster and the rubber box brought down on them. In piercing operations it is a great help if the face of the punch, however small, is given shear.

In shearing an outside profile and piercing and flanging a right-angled lightening hole simultaneously, the template is spring-loaded and the piercing and flanging punch is a light drive fit in the boiler plate. The spring-loading of the template is not for ejecting purposes, but it prevents the forming of an uneven flange. If the lightening hole is not in the center of the component there is naturally a greater amount of strip gripped by the rubber on the side of the greater area. In consequence the strip is pulled to one side after being pierced and a flanged hole with one flange considerably longer than the other is produced.

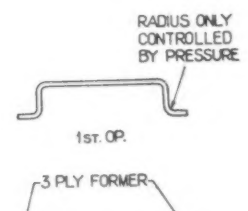
As the top tool descends the strip is gripped by the rubber on the face of the template, which is forced down on its springs, to expose the piercing punch. The flange of the lightening hole is partially formed before the hole is pierced and the punch breaks through the strip before the outside profile is cut. The final pressure produced by the rubber shears the outside profile and completes the flange of the lightening hole.

When forming this type of flanged hole the strip must be normalized. The template has a hole, with radiused edges to assist in maintaining the radius at the bottom of the flanged hole and to allow the rubber to flow in round the punch. In size the hole requires to be of the same size as the outside diameter of the flanged hole, and the radius should be equivalent to the outside radius of the bottom of the flanged hole. The cutting edge of the punch has shear to give it a sharp edge to assist in the piercing. The diameter of the punch is dependent on the size of the hole, length of flange and thickness of material.

Forming Double Bends

Rubber will always flow round the forming block when the part to be formed is away from the bottom bolster. It is difficult to control the radius where the bottom of the forming block meets the bottom bolster. Taking the case of a double bend, the top bends will form satisfactorily, but the bottom bends will not be formed with sufficient sharpness. The required radius at the bends cannot be formed as the radius will vary according to the amount of pressure used. The top face of the forming block takes the most pressure and the face of the bottom bolster receives much less unless, of course, an enormous amount of pressure is used locking the rubber solid. Hence the use of a hydraulic press with a large tonnage. To overcome this difficulty when using a light press a former of thin plywood is placed round the component on the forming block after the first stroke of the press, the ram brought down again and the plywood former will complete the proper radius.

FIG. 6—Illustrating the use of plywood rings to complete the forming of a radius.



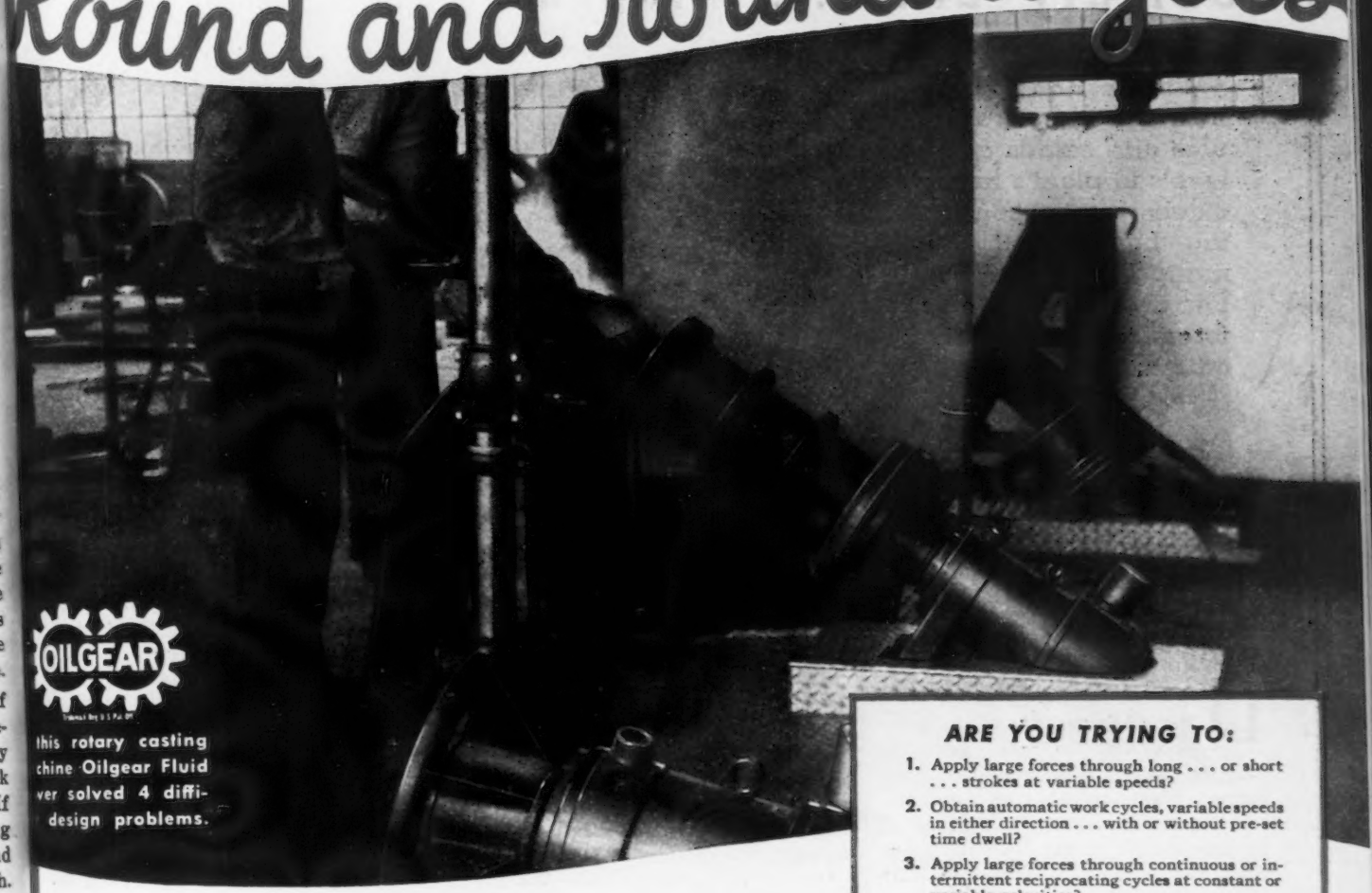
Advantages of Process

It must be understood that a rubber box-tool will not replace a steel tool in the matter of production time once the steel tool has been made. The advantage of the rubber pad process lies in the cheapness of tools and the rapidity with which they can be made.

Compared with the bench method of working, which involves filing the developed blank, drilling and finally flanging with a bench forming block a large amount of time is saved. If the component is cut on a routing machine it still has to be drilled, and finally flanged by hand on the bench. As routing machines are usually kept away from detail sections the routed part has to go to store to be checked in, then checked out again for final operations to be completed at the bench. This involves floor-to-floor time and storage for the unfinished part in the stores.

In any aircraft factory it is the usual practice to have in the fitting or detail sections a row of drilling machines and generally one or perhaps two hand presses. If this type of tooling is to be used, a row of hand presses fitted with different sizes of rubber boxes and bottom bolster should form part of the shop's equipment. They would quickly repay their initial cost in the saving of production time.

Round and 'round it goes



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ONE of the many places in which Oilgear Fluid Power has been applied to solve long-standing power application problems has been on the drives of paper-making machines. Here it has provided the means of closely synchronizing many motions so that the fragile web of paper under manufacture can be handled at much higher speeds without rupture.

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ARE YOU TRYING TO:

1. Apply large forces through long . . . or short . . . strokes at variable speeds?
2. Obtain automatic work cycles, variable speeds in either direction . . . with or without pre-set time dwell?
3. Apply large forces through continuous or intermittent reciprocating cycles at constant or variable velocities?
4. Obtain extremely accurate control of either position or speed of a reciprocating member?
5. Apply accurately variable pressure either static or in motion?
6. Closely synchronize various motions, operations or functions?
7. Apply light . . . or heavy . . . forces at extremely high velocities through either long or short distances of travel?
8. Obtain continuous automatic reversing drives at constant R P M or over a wide range of speed variation?
9. Obtain accurate remote control of speed and direction of rotation, rates of acceleration and/or deceleration?
10. Obtain constant horsepower output through all or part of a speed range?
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12. Obtain accurately matched speed of various rotating elements?
13. Obtain constant speed output from a variable speed input?
14. Obtain full pre-set automatic control, elimination of problems of shock, vibration, etc.?

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Fluid Power

Assembly Line . . . STANLEY H. BRAMS

• Willow Run production surpasses schedules and stands at best levels in plant's history; extensive subcontracting has helped meet manpower problem . . . Labor drive poses threat to all automotive output.

DETROIT—Willow Run has been the whipping boy of the arms program for the past 18 months. It is true that the giant bomber plant, operated by Ford Motor Co., has from time to time failed to meet output quotas since its inception, due in part to difficulties like housing, insufficient and green help, isolated location and numberless design and schedule changes in its product. And yet, the production scheduled out of this plant was of the highest importance in United Nations battle planning.

It is a matter of intense significance to the services, therefore, and of considerable satisfaction to Ford and the auto industry, to report that Willow Run is now on schedule and not infrequently is ahead of day-to-day planning. In this connection, "schedule" means the latest basis, which is considerably higher than the originally programmed levels, and is in fact the highest level yet set up for Willow Run.

Flyaways from Willow Run during the past year have exceeded the thousand mark, Ford officials announced over the weekend. It can be said too that actual production has been enough above 1,000 to make possible at least a fair sized raid or more over occupied Europe. In addition many hundreds of additional components have been produced and shipped knocked down, for assembly elsewhere.

This has become possible because of an about-face in production thinking, decided on last summer when it became obvious that the manpower requirements of the original program could not be met in the tight Detroit area. The about-face was the decision to utilize Willow Run as near exclusively as possible for final assembly operations, and to divert manufacturing from the plant to subcontractors wherever possible (THE IRON AGE, April 29, 1943, page 60).

After six months, the fruit of this wise decision can readily be noted at Willow Run. Plant layout has not been greatly changed, but concentration in the assembly departments is obvious. Full crews are working beside the giant fixtures which hold the wing sections during assembly, rather than the partial crews which were all too common as recently as late last summer. And on the highways leading to the plant come truckload after truckload of completed subassembled sections—small airframe components like leading edges, big ones like fuselage sections. The bulk of some of the items subcontracted was such that special new doors have had to be built into the plant to permit parts entry at points other than the huge doors through which the completed B-24's go to their field tests.

To date, it is figured that about half of the manufacturing in the plant has been subcontracted. At one time the manpower requirement was for close to 100,000 workers; by means of farming out thus far accomplished it is likely that the need for a third to a half of these has been completely eliminated. And by the same token, assembly rates are being enlarged week by week.

This work is being spread on an orthodox subcontracting basis, with competitive bids called for and the lowest responsible bidder given the job. Ford, as operator of the DPC-owned Willow Run plant, furnishes manufacturing equipment and materials to the subcontractors.

THERE are still problems at Willow Run, of course. One of them is turnover; top officials of the company are worried over the quit rate. Much of the blame is attributed to the fact that considerable of the new help available in Detroit today consists of in-migrant labor. This labor, unaccustomed to the high pay scales of the automotive factories, works a while, takes stock of savings, then quits or goes back home to live for a period of time in comparative luxury.

Steadier help is repelled by the location of Willow Run, requiring either a long trip out and back daily, or living in none-too-adequate housing near the plant.

Beyond those always-on-hand problems, Willow Run has others. Under the decentralizing or manufacturing, the bomber plant depends in fairly important share on Ford's River Rouge works for component parts. And River Rouge has been wracked almost day by day since early November by a series of strikes, nearly all of them so senseless and so unnecessary and so unprovoked that management has now gotten to the point where it has all but thrown up its hands, admitted inability to do anything about it, and waited in philosophic stoicism for the wave to run its course. Meanwhile, the flow of parts to Willow Run is inevitably jeopardized, casting a shadow over the outlook ahead.

The Ford strikes—if tieups of the sort can be dignified by the word—are part of customary union tactics in seeking a new contract. They are simply intimidation of the sort every large plant in the country has known in recent years. Last week one day the Rouge foundries, steel mills and other basic production units went down when a foreman came on a man reading a paper on a back stairs, told him to go to work, and got the reply: "I'm too tired to work."

Taking the man at his word, the foreman sent the employee home to rest up for one day—without pay. Protesting this treatment, walkouts ensued in scattered plants of the steel producing and fabricating group for the rest of the day.

Incidents like these stem from the announced United Automobile Workers Union drive, starting with Ford, to smash the "Little Steel" formula. Letters last week from the UAW-CIO to Ford asked the company "to enter immediate negotiations for a general wage increase," with conferences sought for Dec. 1.

ALMOST simultaneously, Chrysler local presidents were called to a special meeting to formulate wage demands for their plants, and word came from the General Motors section of the union, now pressing claims in new contract negotiations before WLB, that those demands could be

Throughout the rush of today's war production — and for many peace-time years before that — Pratt & Whitney Roll Thread Snap Gages have done yeoman service wherever small threaded parts have needed accurate, rapid gaging.

The Roll Thread Snap Gage is an old story to Pratt & Whitney . . . we have made thousands of them . . . for every phase of industry.

THROUGH ALL THE RUSH

This Vital Service Has Not Changed

ACCURACY cannot be rushed . . . not the kind of accuracy that Pratt & Whitney has supplied to industry these past 83 years.

We know full well the desperate pressure and rush of war production . . . we've served faithfully through many of our country's wars. But never in any of these emergencies has the Pratt & Whitney standard of accuracy been sacrificed for speed. Enlarge our facilities . . . yes. Add and train thousands more men . . . yes. But lower our standard of accuracy . . . never. Through peace and war, Pratt & Whitney machine tools, small tools, and gages are made to one rigid standard of accuracy which has never changed.

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WEST HARTFORD • CONNECTICUT

considered part of a request for a general pay advance.

This move has been expected ever since John L. Lewis won his coal miner wage demands, or enough of them to make the record look impressive. As far back as last Spring, when the first coal strikes were in process, high auto union officials told friends privately that the entire situation was headed toward breakdown of the "Little Steel" formula, and that their course was not only clear, but irrevocable.

They said that the administration at Washington had been outmaneuvered by Lewis, inasmuch as if he won his case he would be the hero of the rank and file of labor. In self-defense, these officials pointed out, they would then have to make an out-and-out drive on the "Little Steel" formula if only to protect their own positions and prestige before their followers.

The drive has started, with a vengeance. The no-strike pledge is being all but forgotten in the light of the desire for face-saving and the growing feeling that the end of the European war is not far off. Indicative of the worker state of mind was a strike vote a few weeks ago under the Smith-Connally act, taken at the Chevrolet plant at Flint. The union list of 20 grievances did not include any complaints which could be counted serious by any previous standards in the auto industry. The question voted on was this:

"Do you wish to permit an interruption of war production in wartime as a result of this dispute?"

The vote was: Yes, 8099; no, 2070.

This may come as a shock to some of the labor-coddlers who also believe in winning the war. It may also be somewhat of a shock to the front line troops in Italy and the aviators shot down over Germany. The cure is not yet in sight, for the disease is one which has been encroaching on decency and on reasonable labor-management relationships for a long time, one which cannot be cured overnight. Our Augean stables are filthy indeed, and no Hercules is in sight to clean them.

Founders Discuss Termination Problems

New York

• • • **The National Founders** Association held its 46th annual convention on Nov. 17 and 18 at the Waldorf-Astoria Hotel. Attendance, which was around two hundred persons, was necessarily limited by railroad facilities and hotel accommodations. Subject of the convention was "Victory and Post War Problems." Included among the speakers were the Hon. Alexander Wiley, U. S. senator from Wisconsin; William B. Stout, Stout Research Div., Consolidated Vultee Aircraft Corp.; J. Harold Madden, American Brass Co.; L. W. Houston, executive vice-president, Rensselaer Polytechnic Institute, Troy, N. Y.; and Major Elbridge Stratton, U. S. Army Ordnance, New York.

The election of new officers for the Association was held Nov. 18. Results have not yet been made public.

Additional CMP Developments

• Dir. 37 to Reg. 1 announces that allotments for Army Ordnance tank programs, formerly identified by the program symbols O-5 and O-6, will be identified by the program symbol O-6 in the future. Orders already identified by the program symbol O-5 need not be changed. (Release No. WPB-4580)

•

• Dir. 38 to Reg. 1 contains rules governing the sale of galvanized steel products in controlled material form. (Release No. WPB-LD-80)

•

• Dir. 11 to Reg. 2 places new limitations on inventories of aircraft aluminum extrusions.

•

• Dir. 1 to Reg. 5 has had a clarifying amendment added defining how to obtain aluminum pattern equipment under CMP.

•

• Amdt. 2 to Reg. 5 makes the AA-1 preference rating available to producers of moulding and laminating plastic products, by placing these producers on Sched. I of the regulation. (Release No. WPB-4598)

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Priority Changes

E-2-b—Revoked. (11-16-43)

•

L-131-a—Revoked. (11-20-43)

•

L-134—Amended order modifies restrictions on the chromium and nickel content of extension lead wire for instrument ends. (11-17-43)

•

L-151—Amended order contains a simplified method by which a prospective purchaser may apply for permission to buy domestic watt-hour meters from existing stocks. (11-16-43)

•

L-152—Amendment to Sched. III gives the specific quotas totaling 271,303 for production of strollers, walkers and sulkies during fourth quarter of 1943. (11-20-43)

•

L-158—Amended order contains several changes which result in replacement parts for motor vehicles being freer. (11-18-43)

•

L-221—Amended order deletes paragraph "g", which required WPB approval of production schedules, because of possible conflict with Order M-293. (11-15-43)

•

L-227—Amended order tightens control over fountain pen parts. (11-15-43)

•

L-257—Revised order makes additional restrictions against selling farm equipment for non-farm use except on a rated order of AA-4 or higher. (11-15-43)

•

L-292—Sched. IV defines restrictions on the manufacture of egg and poultry processing machinery and equipment in lieu of the quotas as formerly set up by the order. (11-17-43)

•

M-21-a—Dir. 2 shifts the production of all airborne aircraft steel, except for aircraft bolts and studs, where aircraft quality is specified from open hearth to electric furnaces.

•

M-21-h—Amended order deletes three provisions which impose restrictions on deliveries of tool steel under tool agreements. Dir. 1 of the order further limits the use of alloys in the melting of alloy tool steels. (11-18-43)

•

M-89—Amended order makes it unnecessary for persons having no movement of corundum to file reports. (11-18-43)

•

M-181—Amdt. 1 eliminates monthly reports from consumers of non-critical size diamond dies. These consumers will not file reports once a year. (11-15-43)

•

M-293—Scheduling jurisdiction over capacitators for power factor correction has been transferred to the WPB Radio and Radar Division from the Power Division by shifting the item from Table 8 of the order to Table 9. (11-20-43)

•

M-359—Order places metallic sodium, a chemical in high-octane gasoline manufacture and in making plexiglass airplane noses, under allocation. (11-15-43)

•

M-360—Order provides a program of scheduling of aircraft components. (11-19-43)

•

Int. 7 to PR 3 explains the limitations on the use of a preference rating assigned to the delivery of a material to get material processed. (11-18-43)

•

Priorities Reg. 3 has been completely revised to clarify rules governing the use of preference ratings. (11-19-43)

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Price Briefs

• Order No. 910 under MPR 188 establishes dollars-and-cents maximum prices for cast iron fireplace grates of different weights. These prices are substantially the same as those prevailing last year. (Release No. OPA-3525)

•

• Amdt. 17 to MPR 183 establishes specific maximum prices for machetes, galvanized barbed wire, and galvanized steel sheets in Puerto Rico.

•

• Amdt. 105 to MPR 136 authorizes an industry-wide six per cent increase in manufacturers' prices for bobbins and spools, used in the textile industry. (Release No. OPA-T-1445)

•

• Order 117 to MPR 136 inserts an adjustable pricing provision in a move to match anticipated increased production costs of rayon twisting machinery.

How to get

TOOLS THAT OPEN THE DOOR

to Increased Output Per Machine . . .

IN MOST PLANTS, machine and press speeds are continually checked. But still another way to get more output is to *make a study of machine shutdown time caused by premature tool failure.*

And your tool room is the place to *start* the job of eliminating much of the time spent repairing, regrinding or replacing tools.

In thousands of plants, Carpenter is helping to get at the *causes* of these delays. Through the Carpenter Matched Set Method a definite *system* is provided for picking the proper tool steel for each job.

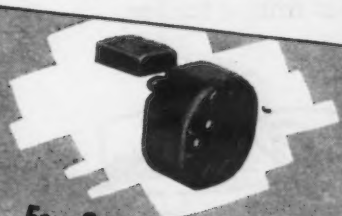
But Carpenter's aid to tool steel users includes more than help in the selection of the proper tool steel. For example, the Tool Steel Manual shown here can be used to simplify heat treatment and do a trouble-shooting job in your tool room. And of course, your nearby Carpenter representative is ready to give you the benefit of his diversified experience with tool steel problems. Get in touch with him.

Put this Printed Help to Work on Your Problems!

This 167-page Manual contains an 80-page Tool Index and Steel Selector, alphabetically indexed by kinds of tools. A flip of the pages guides you to the proper steel for each tool—and then you find simple and complete heat treating instructions. Free to tool steel users in the U. S. A.

The Carpenter Steel Co., 121 W. Bern St. Reading, Pa.

HOW THE MATCHED SET METHOD WORKS

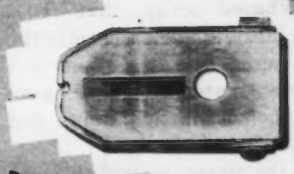


For Greater Toughness He Followed the Diagram

THE JOB: Piercing slots in 14 gauge hot-rolled steel—at 1,200 pieces per hour.

PROBLEM: The piercing die would break after about 2,500 pieces. Heat treatment and hardness were OK, so the Superintendent checked the Carpenter Matched Set Diagram for a steel with greater toughness. He found that *Carpenter R. D. S.* was the steel best suited for the job. And here are the results:

1. Tool life increased from 2,500 to 1,000,000 pieces.
2. Production up 39,400 pieces per month, by eliminating 33 hours of tool-caused idle press time.



Better Wear Resistance Gave Longer Tool Life!

THE TOOL: A cut-off blade for shearing ball bearing slugs.

PROBLEM: Tool life was too short, causing frequent replacement and much wasted time. A tool steel with maximum wear resistance was indicated.

SOLUTION: The solution was easy with the Matched Set Diagram on the job. The Tool Room Superintendent selected *Carpenter Hampden* for the job. And with *Hampden*, shutdown time decreased and production per tool was increased 30%.

Carpenter MATCHED TOOL STEELS

Washington . . . .

L. W. MOFFETT

• Sweeping change in scrap policy asked by White House . . . OPA price policy and organization of the industry under fire . . . Incentive prices or subsidies suggested . . . Imported scrap a minor factor.

WASHINGTON — Unsatisfactory results from iron and steel scrap collections have so disturbed Administration officials that a report has been prepared in the Executive Office of the White House with recommendations for a sweeping change in the government's scrap organization and modification of OPA's price policy.

Looking to the gathering of old material for 1944 melting, the report emphasizes, as a vital part of the steel economy, the need of getting in obsolescent purchased scrap, that it is claimed has lain untouched despite the nation-wide scrap drives. Obsolescent scrap covers material from auto graveyards, homes, farms, stores and factories.

To get it, the report is said to point out, there must be a better price incentive and the peddler and small dealer must be brought into the picture much more prominently than they are at present. Estimates have been made that some 8,000,000 to 9,000,000 tons of this kind of scrap can be collected under a proper organization. This quantity of scrap represents the tonnage necessary to bring open market purchases up to 26,000,000 tons, which, it is insisted, must be obtained to insure high level steel operations for war production.

The report is said to point to the scattered authority over scrap under numerous government agencies throughout the country and to recommend that a central authority be set up to plan a single uniform policy coordinating all phases of the problem.

These phases are:

a. Price
b. Supply (collection)
c. Requirements (determination of needs)
d. Allocations (now handled separately)

Other recommendations are said to be:

That the scrap industry itself be better organized on a war basis. An outstanding achievement would be, it is claimed, the bringing of the peddler and small dealer, largely overlooked now, into the service.

That a study be made of OPA price regulations with a view to finding out their effect on the free flow of scrap.

THAT consideration be given to granting a subsidy or increase in the ceiling price of old material.

This latter suggestion, it was stated, does not mean that there should be a general increase in prices for all purchased scrap, and therefore does not provide a reason for higher steel prices. The only purpose of a higher price or subsidy, it is maintained, is to affect scrap—obsolescent old material—that is not and has not been moving freely. Even more restrictive the higher price might affect only certain sources of obsolescent scrap, such as remote agricultural tonnage that needs this sort of stimulation. The purpose might be accomplished, it was pointed out, in the nature of a freight subsidy or a regional adjustment, particularly where the scrap situation is unusually serious.

Recently the Institute of Scrap Iron & Steel listed New England, the South and the Southwest areas as coming under this category. The Institute is said to have petitioned OPA to stimulate obsolescent scrap collection through a subsidy of $2 a ton, or the lifting of the floor price by that amount. It suggested that original collection methods such as the use of small yard operators and peddlers be restored. The report sent to the White House appears to be in accord with the principle, if not the exact nature, of the Institute proposal. But the opinion prevails that if it materializes the plan will be a slow process.

Sharing concern over scrap supplies is the House Steel Shortage Investigating Committee, headed by Representative Frank W. Boykin of Alabama. This committee will begin open hearings soon and will call as witnesses both consumers and dealers along with government officials. The committee is studying whether a scrap shortage in 1944 is imminent. It apparently is proceeding on the premise that there will be a shortage and that it will threaten high steel production in view of the expanding open hearth capacity.

CONGRESSWOMAN: Clare Boothe Luce discusses factory procedure with Charles Belanger, Packard test engineer, when she toured the Packard war plant as one of a fact-finding group from the House Committee on Military Affairs.

THE committee, however, it is said, has in mind suggestions that the government go in for sponge iron production, an old political fetish that has gained rather wide support at both ends of the Capitol. It is directly related to the grandiose scheme of recentralization of the steel industry under the sponsorship of Senator Pat McCarran, Democrat of Nevada. This group affects to think that there should be a steel plant spotted wherever there are ore and coal deposits, regardless of their location, size or quality.

No figures are available on imports of scrap but it is understood that the tonnages are relatively small. There are two classes of incoming shipments. One class comes in under supervision of the Foreign Economic Administration. This scrap is high-

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grade commercial material, prepared in the foreign areas where it is gathered and made ready for charging when it enters this country.

The other class is scrap shipped from battlefields by the armed forces and is unprepared. It contains much alloy material and requires cutting and preparation in this country before it can be shipped to mills. It is said that incoming battlefield scrap shipments will not average over 2000 tons a week.

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Auto Executives See Post-War Car Boom; Long Production Lag

Washington

• • • **Two automotive industry** executives, K. T. Keller, president of the Chrysler Motor Co., and J. H. Marks, vice-president of the Packard Motor Co., told two Senate committees last Friday that there is going to be a tremendous post-war demand for automobiles.

Mr. Keller who testified before the Senate Truman Committee said that it would be around seven to eight months before production got into full swing. Mr. Marks who testified before the George Post-War Planning Committee said that for Packard it would take four to six months to produce its first automobile. Mr. Keller declined to say how long it would be before the first cars were produced.

A tremendous boom and an acute demand for cars, lasting for two or three years after the war, was the way Mr. Marks summed it up.

Both executives stressed the point that the government should immediately lay out a plan to dispose of machinery and equipment owned by it and now at work in plants of private motor companies. Mr. Keller said that machine tools and other industrial equipment should be sold on the spot to manufacturers so that all American industry could be modernized.

However, Mr. Keller said there was still a war job to do. He explained:

"I think if we can shorten this war by one month it will mean more to the country than any peacetime plan you can work up one month ahead of time, and I think everything should be directed to that purpose . . ."

Concerning the picture of moving machinery from war plants for peace purposes, Mr. Keller said: ". . . it seems to me that after the government has decided what it is going to keep in the way of facilities, those jigs and fixtures ought to be moved just once from where they are past the government men who will identify them and into the scrap pile and not to be moved into the yard of some storage warehouse and held until the General Accounting Office audits them because they are scrap and are not worth a penny on the dollar."

Senator Taft, Republican of Ohio, said that it was his suggestion that the machinery be stored in the government's munitions plants which would not be used during the peacetime.

Revealing that DPC owns $16,000,000,000 worth of machinery and equipment, Mr. Marks called attention to the standard clause in DPC contracts requiring a contractor to wait 90 days before storing the machinery at government expense. He indicated as did Mr. Keller that the government would have to do something about this delay in removing its machinery.

Pointing out that depreciation and the fact that machinery prices during the war had shot up 35 to 40 per cent, Mr. Keller said that the government should price tools accordingly. However, he was opposed to machine tools getting into the hands of dealers who would quickly dispose of the most desirable ones and leave the remainder to overhang the machine tool market for 10 or 15 years.

"It would seem to me that the government could determine right now and sell a lot of this equipment without hurting the war effort. These machine tools run into two classes: one, so-called standard * * * the highly special tools like the gun barrel-drilling machines that industry in general would have no use for.

"But, if the services could determine on a fair price at which this equipment could be sold, I think we would be willing to pick out the equipment, the machines wo would like to retain in our industry, thereby releasing tools of perhaps an older vintage to people who are willing to pay for them now and still leave them on the war contract until it is completed, or as long as the emergency exists."

THE BULL OF THE WOODS — BY J. R. WILLIAMS

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...what is it?

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Left is a SHEFFIELD MULTICHEK with which the operator makes 12 critical inspections — eight dimensions by a quick glance at a master signal light while four dial indicators check squareness at one point and concentricity at three points.

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DIMENSIONAL CONTROL is the term applied by SHEFFIELD to a comprehensive, scientifically planned system of precision measurement which assures that production will meet the required standards of size and form.

DIMENSIONAL CONTROL is the means of attaining uniform, specified interchangeability — without it there could be no mass production of predictable mass quality. Because of it, replacement parts fit as-good-as-new in our refrigerators, autos, cleaners and washers that we strive to keep operating these days. Because of it, repairs can be made to our planes, guns, tanks, ships and automotive equipment at the battle front.

It is only by the proper use of gages and precision measuring instruments that dimensional control is achieved. When gages such as MULTICHEKS and PRECISIONAIRES are used, a number of critical dimensions can be checked simultaneously for both upper and lower tolerance limits. By checking both limits of every critical dimension of every part, much valuable time is saved in assembly. Both time and floor space are saved in inspection and much greater accuracy is secured than it is possible to get when fixed size gages are used.

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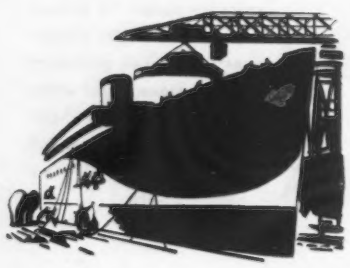
WEST COAST . . . OSGOOD MURDOCK

• Another manpower freeze and ceiling has the California guinea pigs groggy . . . Bethlehem's third interest in stout young Rheem is another straw in the post-war competitive wind.



SAN FRANCISCO—Another freeze swept California last week, no more welcome than any freeze has ever been in that supposedly golden land of balm.

In normal peacetimes, when a freeze struck silently in the night (and it was seldom if ever a matter of record) thousands of smudge pots were lighted to generate great clouds of black smoke and a little heat. Sometimes the temperature could be held at three or four degrees to prevent some damage. A freeze was an act of God and little man couldn't do much. Nor did Californians talk or do much about freezes in those days. It was inevitable; Kismet. If enough oranges were lost, prices would rise and benefits follow.

This new freeze last week followed many previous freezes, chills and cool whiffs. So this new act of the War Manpower Commission was accepted with almost the same inevitability that received the former acts of God. Instead of lighting the old smudge pots, all employers of 50 or more fired a barrage of questions, exceptions, special problems and quandaries at the harrassed and groping Area Manpower authorities. In many instances temperatures rose much more than four degrees. There was, in fact, far more heat and even less light than in the old smudge citrus days, to the point that any possible benefits of the freeze seemed in danger of melting before thick, black, billowy clouds of misunderstanding.

Any old citrus hand could have tipped them off in the first place that a little local freeze is beneficial but that a tight, statewide, even Coastwide universal freeze just won't hold. Too many air currents, pressures and counter-irritants.

This freeze seemed simple enough when it was announced on a Sunday, effective the next morning, Monday. For every employer of more than 50 persons, his highest number of employees on any payroll day during October will be his ceiling for total employment. The maximum number of his October male employees less 10 per cent is his man ceiling. As men leave, therefore, he must replace by women until his maximum October men are down 10 per cent. He cannot employ more total persons than his October maximum.

For employers of less than 50 workers, October maximum is the ceiling, but men or women may be hired as replacements.

Whether an employer may obtain replacements is to depend on the urgency of his work to the war effort as determined by the WMC urgency committee governing referrals through the U. S. Employment Service. By Nov. 25 employers are required to file with WMC a declaration of the total number of their employees on their maximum October date.

Next day these temporary manpower ceilings were raised for 12 types of employing establishments, including hospitals, scavengers, terminal truckers, public warehousemen, longshore operations, freight forwarders, railroads, railway express, local transportation, water transportation, logging saw mills, canneries and food processors.

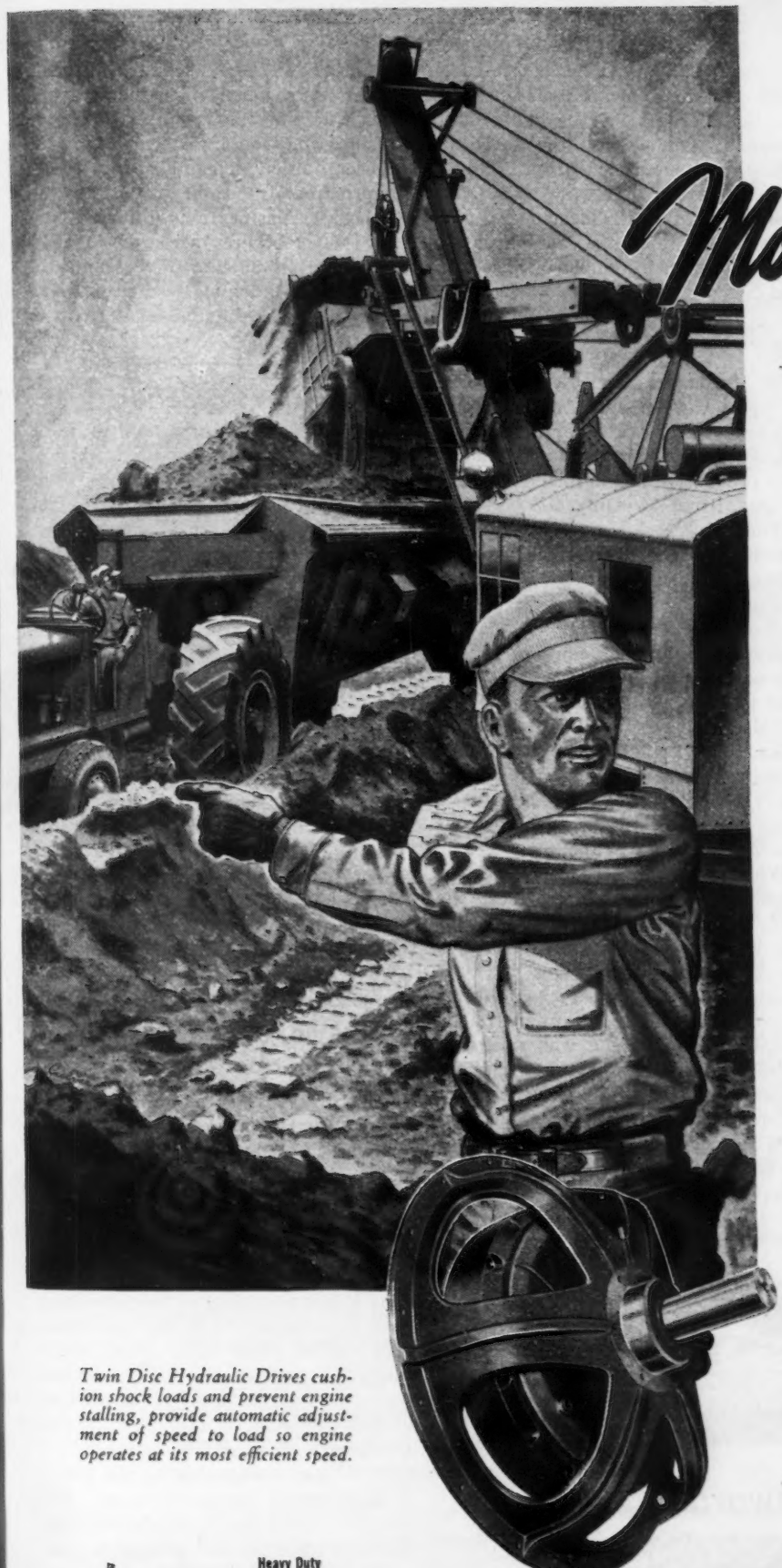
Questions poured in by phone, by mail, in person. Harried war contractors rushed to their procurement agencies for help. "All through October I was looking for a plant carpenter. Now I've got one. He's a man. Can I put him on?" "We have a Navy contract. We've had an application with U. S. Employment Service for turret lathe operators. They didn't send us any in October. Half of those we had are leaving. What are we to do?"

Rank and standing both on the production urgency list (plants or projects) and the manpower priority list (skill or craft) have been kept confidential, so that no employer knows where he stands or what his prospects are. On paper, it is the aim to make the U. S. Employment Service a vast statewide and eventually Coastwide hiring hall, automatically screening applications against project urgencies, available manpower skills and plant employment ceilings. But complexities are so many and the concept so vast that so far no one has been able to catch a glimpse of the forest because of the trees, snags and sucker shoots. Two valiant, able and public spirited men, James P. Blaisdell, northern California Area director of the War Manpower Commission and Sam Kagel, deputy director, have labored heroically to stem the tide of problems and hold the line on the newest ceiling freeze. But their chances were not voted brilliant by sideline analysts after the first week's exposure.

ON seeing the modest financial page announcement that Bethlehem Steel Corp. has invested $2,645,000 to buy approximately one third interest in the Rheem Mfg. Co., comprising 230,000 shares of the company's common stock, observers on the West Coast bulged their eyes, whistled gently and commented "There she starts."

A dozen years ago the Rheem Mfg. Co. first came into being as a simple partnership between two young fellows in their twenties to make oil drums for the Standard Oil Co.'s refinery at Richmond, Cal. By 1937 the husky, industrial youngster, under the direction of its shrewd and able young captains began to spread eastward, buying steel container and sheet metal fabricating plants at Houston, Richmond, Newark, New Orleans and Cleveland and establishing a southern California plant at Southgate. The former partnership was incorporated and the stock first listed on the San Francisco Exchange, then on the Curb and finally two months ago on the New York big board.

The company now owns 13 plants and operates several more on management contracts with the Navy. Its commercial products now include metal containers, septic tanks, floor furnaces, appliances and gas and electric heaters, although all now are largely temporarily replaced by war contracts. Net sales for the first nine months of this year were $39,035,848. Richard S. Rheem, president, is 40 years old and his brother Donald L. Rheem is executive vice-president. Another



Twin Disc Hydraulic Drives cushion shock loads and prevent engine stalling, provide automatic adjustment of speed to load so engine operates at its most efficient speed.

Moving day

FOR MOUNTAINS

With things as they are now, every day is moving day for millions of tons of coal and building material—for countless yards of dirt on road and building sites. Rapid, economical handling of mountains of raw material is essential to low-cost production of the goods which make people healthier, more comfortable, better fed. Coal, for example, would be higher-priced were it not for equipment which brings to its handling the strength and stamina of giants.

Wherever power shovels, cranes and draglines are used, there too you will find Twin Disc Clutches and Hydraulic Drives. In this field, as in so many others, the Twin Disc Clutch Company's quarter century of experience in industrial clutch design and manufacture adds to the store of knowledge needed to make man's work easier.

Here is one fact which has become crystal clear under conditions governing operation of industrial equipment today. Whether it's a tractor clutch or oil rig power take-off; a marine gear or hydraulic torque converter on a rail car, a power link built by Twin Disc adds more than its share to the stamina, endurance and dependability of the equipment on which it is used.

If you build, buy or use equipment having both driving and driven units, it will pay you to know Twin Disc Clutches and Hydraulic Drives well. Get in touch with Twin Disc engineers now for the kind of help and information which improves equipment performance and lowers operating costs. TWIN DISC CLUTCH COMPANY, Racine, Wisconsin, (Hydraulic Division, Rockford, Illinois).

brother, William K. Rheem is a director. The company has always been a good Bethlehem customer, so good that Bethlehem sheets were carried on consignment at Rheem plants before the days of allocation. One Rheem plant is at Sparrows Point, Baltimore, on Bethlehem's doorstep.

With the consummation of this deal, another principal steel supplier has a sheet, drum and container connection of importance on the West Coast. Columbia Steel took over Boyle Mfg. Co., now a separate important subsidiary of U. S. Steel Corp. Inland Steel Container Co. is an Inland subsidiary with a plant at Richmond, Cal. The battle for West Coast post war industrial fabricating and steel products customers has just begun.

ON Puget Sound the Bremerton Navy Yard is campaigning for 8000 additional workers, principally to handle repair work. Pre-Pearl Harbor fathers have been guaranteed deferment, and farmers and others with a 2-C draft status are guaranteed release and return to their former work when next season demands. Furthermore, the yard expects to take on former employees of 50 to 55 small local shipyards whose wooden vessels and landing barges are no longer to be built, after the first of the year.

About March 1944 is the present prospective first production of plates from the Geneva, Utah, DPC mill. Material delays, particularly applying to electrical equipment, cranes and finishing installations keep setting the schedule back.

Steel deliveries have eased noticeably within the last 30 days on the West Coast. Sizable tonnage of bars was placed a few weeks ago by the Army engineers for November (immediate) delivery. Sheets are easier with warehouse men. Structural steel on rated orders can be delivered in December, and plates in March for Maritime Commission projects and in June for others. Moving three Navy cruisers and seven destroyers from West Coast to East Coast yards and termination of a number of miscellaneous supply, auxiliary and other craft have relieved the backlog and reduced the pressure.

IN 76 foundries in 16 cities of Oregon and Washington, 2942 foundrymen voted yes to the question "Do you wish to permit an interruption of war production in wartime as a result of this dispute." Only 482 voted no.

The election, largest so far in the Northwest, was conducted by the National Labor Relations Board, accompanied by observers from both management and labor. The vote represented 81.4 per cent of eligible voters and the decision was 85.9 per cent positive.

This "yes" vote merely permits the union to call a strike at its option. Foundries are not guaranteeing delivery, though they are hopeful a solution may be worked out under the Twelfth Regional War Labor Board.

When the union agreement with the foundries expired last April 1, the AFL International Molders and Foundry Workers union asked for a 25c. per hr. increase in wages in most classifications. When negotiations were referred to the War Labor Board, a 3c. increase was awarded, which the foundries have been paying retroactive to April 1. But the union resisted the increase as unsatisfactory, particularly in view of an award on Sept. 14 by the Tenth Regional War Labor Board at San Francisco granting an increase in California which puts journeymen molders and coremakers up to $1.28 an hr., 8c. over the present Northwestern rate. The present union demand is for a rate approximately equal to California although classifications differ. Foundry helpers were increased in California from 86¼c. to 95c. and the Northwest unionists want to bring their present minimum of 88c. up to California's 95c.

Some Copper Sellers Miss Higher Prices

Washington

• • • **The Copper Recovery Corp.** last week announced that government prices will not be paid to those holders of copper products and copper base alloy products, who have received inquiries from the government as to their willingness to sell their material for listed prices above scrap prices, but who, by Nov. 30, have not expressed to the Copper Recovery Corp. a willingness to sell at such prices.

The Copper Recovery Corp., it was stated, will not necessarily buy all material of which holders have expressed a willingness to sell. However, material for which no such expression of willingness has been received by Nov. 30, will in no event be bought by the Copper Recovery Corp. at the government prices, it was pointed out.

Cleveland Mourns "Acute" Labor Classification

Cleveland

• • • **After a long** and hard, but futile, fight by manufacturers, civic and business organizations, and the city administration, this week Cleveland moved into the WMC classification of "an acute labor shortage area." The classification will become effective Dec. 1, but according to the Cleveland area director of the WMC, the situation will be short lived. Provision is made to review the labor market every 30 days, and if conditions change appreciably, adjustment of the area's classification will be made.

The biggest objection to the group I classification is that the city will receive no renewal of supply contracts for such items as tent stakes, cooking and eating utensils, and articles of wearing apparel for the armed forces. From October, 1942, to January, 1943, Cleveland was an area of acute labor shortage and the effect was felt only when the Army Quartermaster Depots began refusing to accept bids for such renewals.

. . . Cited for Awards . . .

• • • **The following companies** have been awarded the Army-Navy "E" for efficiency in war production.

Driver-Harris Co., Harrison, N. J. (white star)
Weatherhead Co., Cleveland (white star)
Sundstrand Machine Tool Co., Rockford, Ill. (renewal star)
Soule Steel Co., San Francisco
Buffalo Bolt Co., Buffalo
Whiting Corp., Harvey, Ill. (renewal star)
Davenport Besler Corp., Davenport, Iowa
Ken-Tool Mfg. Co., Akron, Ohio
Candler-Hill Corp., Plant No. 1, Detroit
Cleveland Planer, Cleveland
DeVlieg Machine Co., Ferndale, Mich.
Flint Mfrs. Service, Flint, Mich.
Hercules Powder Co., Bacchus Plant, Bacchus, Utah, and Joplin Plant, Carthage, Mo.
Hudson Sharp Machine Co., Green Bay, Wis.
Perfection Gear Co., Harvey Plant, Harvey, Ill.
Posey Mfg. Co., Hoquiam, Wash.
Pyro Clay Products Co., Oak Hill, Ohio
Square D Co., Kollsman Instrument Div., Elmhurst, L. I., N. Y.
Universal Blank Co., Inc., Southbridge, Mass.

HILLS-McCANNA MAGNESIUM ALLOY SAND CASTINGS . . .

Give Important Aid to This Vital Member of the "Invisible Crew"—

THE BENDIX STROMBERG AIRCRAFT CARBURETOR

. . . by providing strong, light-weight Throttle Bodies to contribute their share toward the better fuel economy and more constant power which this superb Carburetor assures our fighting planes.

This assignment presented an out-of-the-ordinary casting problem, to provide correct physical properties and to assure pressure-tight castings. The unusual talent, experience and facilities of the Hills-McCanna organization met these conditions perfectly.

The important advantages of Hills-McCanna Magnesium Alloy Sand Castings may similarly benefit your own civilian products in the period ahead. May we discuss the matter with you?

HILLS-McCANNA CO.

3017 North Western Avenue, Chicago, Illinois

PROPORTIONING PUMPS - AIR & WATER VALVES - CHEMICAL VALVES
MARINE VALVES - FORCE-FEED LUBRICATORS - DOWMETAL CASTINGS

Fatigue Cracks . . .

BY A. H. DIX

Newton Was Right

• • • We hope that the postwar plans of some manufacturer include a light, portable stand for use by speakers who use charts. Few halls have adequate easels, and the speaker usually has to call on helpers who look embarrassed, who obstruct the customers' view, whose arms get tired, and who sometimes spill the charts.

Which reminds us to mention that the brains department's James A. Rowan, now on lend-lease to the WPB, made a talk the other night in Detroit before the Assn. of Iron and Steel Engineers. He had a stack of charts—big ones. A helper hauled the easel to the center of the stage, but neglected to notice that the easel had a high center of gravity.

As he tugged on the stand, the charts began to wobble. He clutched wildly, swung backward, juggled and balanced, but in vain. The charts fell on him like April rain on a hitchhiker. After the charts were reshuffled and put back on the stand, Mr. Rowan began his talk. The charts came up sideways, upside down, and backwards, but Mr. Rowan finally reached the culmination of his discussion, wrapping it up neatly with the final chart.

The helper removed the final chart, and lo! there were two more, like stray grace notes from the piccolo, after the crashing finale of the Rhapsody in Blue. Mr. Rowan cracked, "This is the way we're supposed to do things in Washington."

Aptronyms

A heat treater at the U. S. Naval Air Station, Corpus Christi, Tex., is named Edwin T. Harder.

—*Alfred B. Hard, Ann Arbor, Mich.*

A furrier at 228 N. Eutaw St. bears the name of M. H. Peltz.

—*19th Reader, Baltimore*

Red Corpuscles in the Classified

• • • You have noticed that the help wanted ads are no longer as bloodless as a librarian. The best of them are now a cocktail composed of equal parts of originality, imagination, and persuasiveness, sharpened with a dash of good humor. As a specimen we submit this Los Angeles restaurant ad sent in by alert Ray Kay, your So. Calif. radar:

WANTED—BOY TO SAMPLE OUR PIES
(And to carry a few dishes on Sat. & Sun.)

Our favorite is one that kinetic Bill Hoffman, our So. Ohio staffer, spotted in the help wanted columns of Cincinnati papers. The ad, inserted by the Streitmann Biscuit Co., is headlined:

BISCUIT PACKIN' MAMAS!
Lay That Bridge Deck Down

Obstacles vs. Tight Spots

. . . producers of . . . have been hurdling one tight spot after another ever since the war began.

—THE IRON AGE, *Nov. 4, p. 108B.*

Tight spots are not hurdled. They are fought or wriggled out of.

Loud Bursts of Apathy

• • • Speaking of tight spots, what amazes us is the lack of interest in the efforts of those who are trying to hold the inflationary line for us citizens. The boys who are carrying the ball for the farmers, for labor, for the cattlemen and so on have highly vocal cheering sections. Every gain is acclaimed to the point of hysteria. Every block is greeted with heartrending groans.

But our boys seem to be playing for the St. Aloysius Academy for Deafmutes. When one of them risks a broken jaw to make a dangerous tackle, the best he can hope for is silence if he connects and hoots from the opposition if he misses.

Of course, no one can play good ball for long under such conditions, and to our economically lay eye it looks as if we will lose even the goal posts unless we find some cheer leaders who can excite us to the roaring point.

Blurb

• • • Cheers for good work and jeers for bad keep the adrenal gland from getting clogged up. Which is why our heart bleeds for those publications forced to perform before cold audiences. Ours, praise be, is highly responsive—quick to bestow pats on back or posterior. The former we proudly display, before you; the latter we modestly nurse in silence.

The high-up pats we prize particularly are the cushion-shot kind—the ones not aimed directly at us. For instance, the other day we happened upon a bulletin a certain technical society sends out monthly to members. In it is a list of articles for recommended reading.

We led the runner-up by 75 per cent, and if you will let us keep our grip on your lapel for just another second, we were just one mention shy of equalling the total of the next six publications combined. Your favorite family journal's brains department has more talent than Main St., Hattiesburg, Miss., has khaki on the Saturday night following payday.

Syncopating Sixty-Ninth

• • • We mention Hattiesburg as that is the nearest town to Fort Shelby, where the 69th Division is in training. And the 69th is the outfit of a sergeant we met up with on the way to Washington last week. We got to talking; he showed us some pictures of his wife, and also let us look at his furlough certificate, which was signed by a Colonel Harmony. When we remarked what an unusual name it is he said, "Yes, and until he was transferred recently we had a Lieutenant Melody."

"S" Dropper

• • • Not wanting to appear hypercritical, we have not criticized the plastic people for sticking to the awkward plural "s" in "plastics presses," "plastics manufacturers," and so on. But we would like to congratulate the Bigelow-Sanford Carpet Co. on trailblazing by naming its new department the "Plastic Division."

The oddest instance we have seen lately of uneasy pluralizing is in this letter from a New Zealander:

For nearly a year we have lived without wallpapers on the walls . . .

It could, of course, be worse. He could call it "wallspapers."

Puzzles

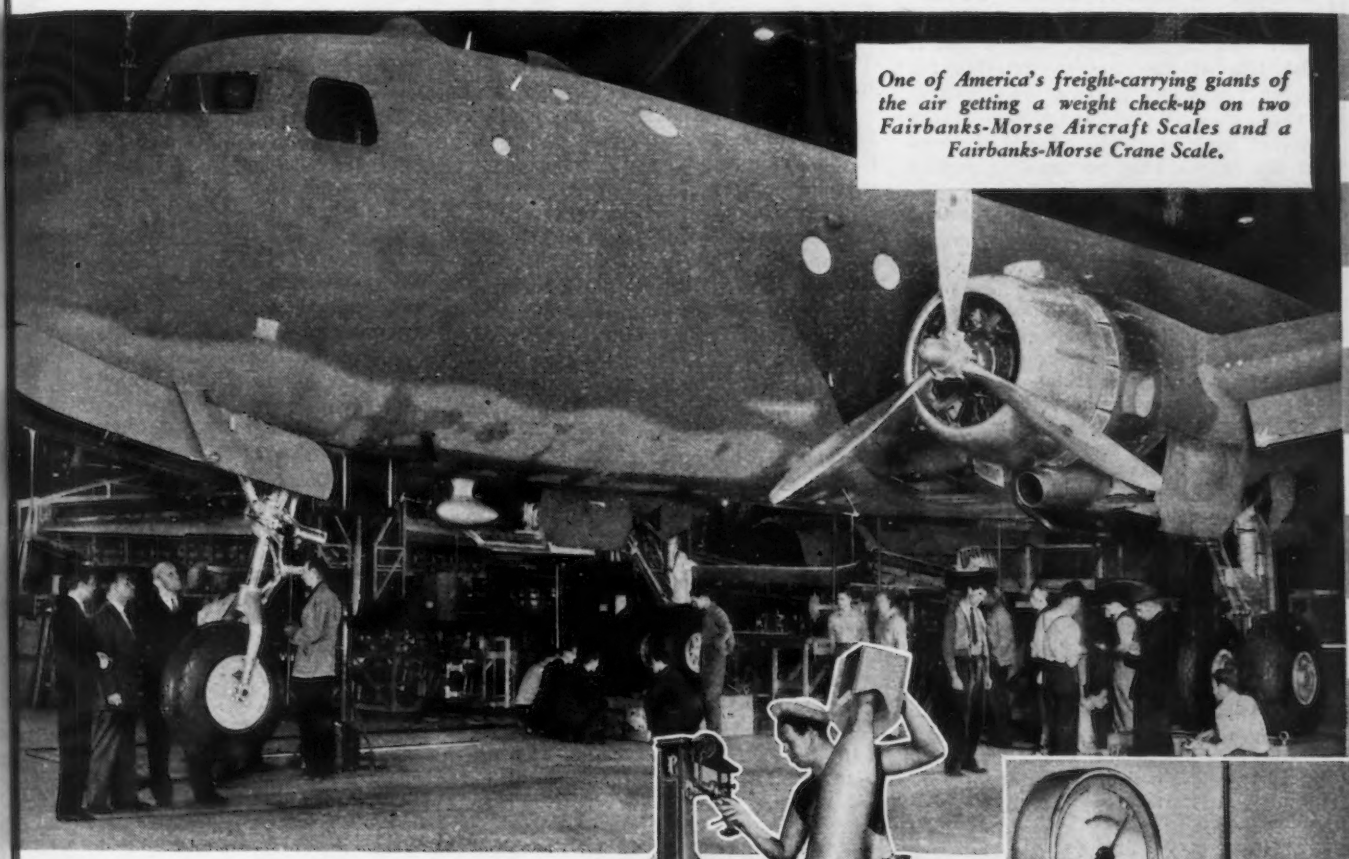
As you saw in an instant, last week's boy solved 10 problems correctly.

If you crack this one, sent in by A. C. Wilcox, in less than a half hour move up to the front row:

In Rifle Row live five officers—a brigadier, colonel, major, captain, and lieutenant. Their names, not respectively, are Grenade, Howitzer, Mustardgas, Tank and Verylight. Each has one sister and one only, and each is married to a sister of one of the other officers. At least one of the brothers-in-law of Mustardgas is superior in rank to the latter.

The captain did not serve in Gallipoli. Both brothers-in-law of Howitzer have served in France, as have both brothers-in-law of Tank, but neither brother-in-law of the brigadier. Tank has served in Palestine, as have both his brothers-in-law; the lieutenant has not. The colonel has served in China, as have both his brothers-in-law. Tank has served in China, as has only one of his brothers-in-law. The brigadier has not served in China but has served with both his brothers-in-law in Gallipoli. Verylight has not served in either Gallipoli or in Palestine. What is each officer's name?

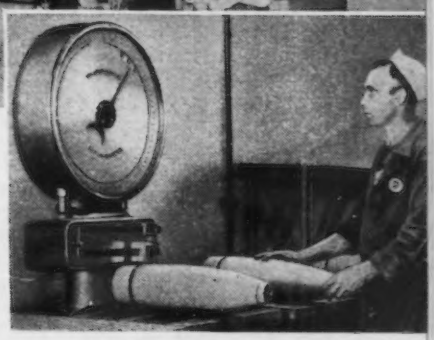
Fairbanks-Morse Scales in Warwork



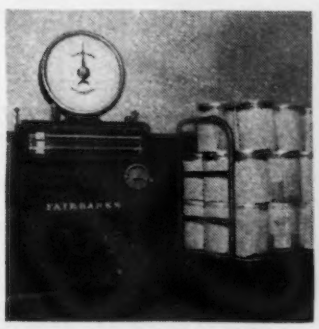
One of America's freight-carrying giants of the air getting a weight check-up on two Fairbanks-Morse Aircraft Scales and a Fairbanks-Morse Crane Scale.

• WARWORK means *weigh-work* for Fairbanks-Morse Scales. They're weighing munitions . . . food . . . chemicals . . . tanks . . . aircraft . . . shells . . . just about everything, in fact. They are weighing at speeds which human hands can't match. They're weighing with accuracy that human eyes can't equal. They're working in endless shifts that human stamina can't endure. They're helping to speed up America's war effort on the production front, for Fairbanks-Morse Scales are "at home" on the production front, in peace or in war. Fairbanks, Morse & Co., Fairbanks-Morse Building, Chicago, Illinois.

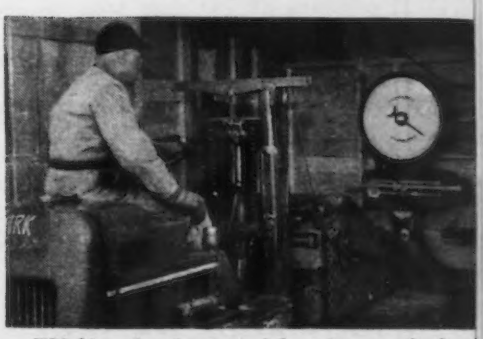
Weighing an "egg" for the Axis.



Correct weight for accurate gunnery.



Frozen eggs—NOT for the Axis!



Weighing charging materials at iron works furn

FAIRBANKS-MORSE

DIESEL ENGINES
PUMPS
MOTORS
GENERATORS
WATER SYSTEMS
SCALES
STOKERS
FARM EQUIPMENT
RAILROAD EQUIPMENT

Scales

Dear Editor:

SEIZED PATENTS

Sir:

I have been following with interest the list of seized patents you are publishing serially. On page 97 of your Nov. 11 issue you say, "Thus, if the life of the patent extends for seven years and the war ends in two years, at least five years' use of the patent may be made beyond the end of the war. This pertains to enemy patents. . . ."

Does this mean that at the end of that time, the licensee is no longer permitted to manufacture under the license?

ANONYMOUS

● **The expiration of any patent means that that patent can no longer be used to prevent others from manufacturing under it. Hence if a person can manufacture under an APC license during the term of the patent licensed, he can continue to do so as long as he wishes after it has expired.**

The licenses being issued on patents seized from enemies are for the duration of the patent, non-exclusive and royalty free. Negotiations with the governments-in-exile have held up the issuance of licenses on patents seized from citizens of occupied countries. It is expected that these licenses will likewise be for the duration of the patent and non-exclusive but royalty free only for the duration plus six months, at the end of which time they would be royalty bearing, a reasonable royalty being established by the Custodian either now or in the six months following the end of the war. —Ed.

SOLDER TROUBLE

Sir:

The self-fluxing rods we have been using to solder stranded copper wires to plated Monel metal parts draw moisture and "ball up" instead of flowing when damp. The rod is dirty and throws off obnoxious fumes.

Is there any silver rod you can recommend as a more satisfactory agent? It must have a flowing temperature of 700 deg. with no more than 2 per cent silver content. It is to be used with an electric soldering iron without acid flux of any kind and must withstand high current without melting.

N. K.

● **For many years, the gap between 600 deg. and 1100 deg. F. has been a problem in the joining of metals. None of the authorities we consulted has an answer. Can any reader offer one?—Ed.**

POST WAR ELECTRIC STEEL

Sir:

At the recent National Metal Congress there were discussions of post-war planning in electric steel, particularly methods for the feeding of hot metal to electric furnaces, previously remelted in open hearth, bessemer or cupola furnaces.

I wish to call attention to a duplex proces I had the opportunity to learn of from one of the most important fine steel works in France, owned by the Reynolds Motor Co., in Paris. The plant was situated in Hagondange in the Province of Lorraine, connected with the former Thomas Steel Mill built by Thyssen in 1912.

The three electric furnaces of about 25-ton capacity each were fed with liquid Thomas steel of normal commercial quality, delivered by a closed ladle traveling on wheels over a distance of about three miles. Before pouring the liquid metal into the electric furnace, a de-phosphorizing method was used by pouring the Thomas steel from a large bessemer converter into a bath of molten limestone previously put on the bottom of the ladle. An extensive elimination of phosphorus and sulphur was thereby accomplished so that a sufficiently refined liquid steel of virgin low carbon quality, absolutely free from any alloy, was poured into the electric furnace. Mostly chrome-nickel steel of the type S.A.E. 3215, 3340, 3415, etc., was manufactured for the construction of motor cars and airplanes. The ingots were re-rolled at the same plant into strips, bars and profiles. Production in 1940 was about 10,000 tons monthly.

In this connection, it is interesting to mention that the supply of nickel and chrome was made mostly from nichrome scrap of the heat-resisting type, alloyed with 20 to 55 per cent nickel and 15 to 25 per cent chrome. This type of scrap came from the U. S. A. only, consisting of annealing and heating boxes and other similar castings and forgings.

No doubt this plant is very important at the present time for the German war machine.

MAX STERN

New York

SENOZIMIR MILL

Sir:

I would appreciate any information you can give me in regard to what I understand is a new type mill. As told to me, the patentee of this mill is a man named Senozimir, and the principle is two very small diameter working rolls supported by two back up rolls. I understand the mill has great flexibility in the number of sizes and sections that can be rolled.

R. W. RICHARDS

307 Rochelle Street,
Pittsburgh 10

● **For a comprehensive description of the Senozimir mill see the July 23, 1942 issue.—Ed.**

EXTRUSION DIE CATALOG

Sir:

In your Nov. 4 issue, you mention that the Aircraft Standards Committee has issued a catalog of aluminum rolled form sections, and that a new catalog of aluminum alloy extrusion dies has been prepared. Where can we get these catalogs?

W. KAUDERS

Hydropress, Inc.,
570 Lexington Avenue,
New York

● **From the National Aircraft Standards Committee, care of Aeronautical Chamber of Commerce, Room 610, Shoreham Bldg., Washington 5.—Ed.**

EDITORIAL INDEX

Sir:

We make a practice of cutting from old copies of your publication articles of particular interest. We wish to keep these in some form of index.

Will you please inform us if you issue any index?

I. J. CATON

Lake & Elliot, Ltd.,
Braintree, Essex,
England

● **An editorial index is issued every six months, and is supplied without charge to subscribers who request it. Your name is being added to the mailing list.—Ed.**

DETINNED SCRAP IN CUPOLA

Sir:

We are detinners and are producing each week about 100 tons of detinned steel scrap. The scrap is briquetted into a form suitable for cupola charging. Our problem is to find an outlet for it. It is unacceptable to the steel founders because of the tin content. We have successfully treated in a cupola a mixture (50/50) of this scrap with clean pig iron but this is not always practical. Is there a suitable cupola designed to meet an all-steel charge or is an electric furnace essential?

JAMES L. MOORE, Secretary

Tin Recoveries, Ltd.,
422 Collins Street,
Melbourne C.1, Australia

● **The Battelle Memorial Institute, Columbus, Ohio, supplies this answer:**

"Cupolas operating on an all steel charge are in common use in this country today, and you should have no trouble in melting a charge of detinned scrap provided it is properly briquetted. We have asked the Whiting Corp., Harvey, Ill., to send you data on cupolas suitable for all steel charge.

"If it is desired to treat the resulting cupola metal in a side blow converter, it would be necessary, of course, to reinforce it with an addition of about two per cent silicon.

"It is common practice, and considered good practice, to desulphurize cupola metal by treatment with sodium carbonate or sodium hydroxide in order to remove at least a part of the sulphur that is picked up from the cupola coke. But in our belief such a treatment will not remove any of the tin content."—Ed.

FORGINGS that GAIN TIME

Confronting all of us today is the supreme task of making time, because it is such a vital element in the strategy of modern warfare. T & W makes forgings that gain time . . . time that results in more war production at a faster rate. Plus or minus a few minutes of time at any stage in forming a forging may gain hours in the length of time it takes to get the forging onto your assembly line. T & W Forgings usually require less machining and finishing and that's where they gain time for you. Ask a T & W Forging Engineer about forgings that gain time.

FORGINGS

USUALLY COST LESS
at the Point of Assembly

TRANSUE & WILLIAMS

STEEL FORGING CORPORATION · ALLIANCE, O.

SALES OFFICES: NEW YORK, PHILADELPHIA, CHICAGO, INDIANAPOLIS, DETROIT AND CLEVELAND

This Industrial Week . . .

- ***Slashing of Arms Output Demands Immediate Action***
- ***Basic Principles Needed from Top of Administration***
- ***Labor Fights Layoffs; Industry Tied by Tight Controls***
- ***Lifting of Limitation Orders and M-126 Predicted***

PROBLEMS which a few weeks ago seemed remote for Washington's production planners are coming forward quickly now. The difficulties forced upon war industries by recent heavy slashes in contracts demand immediate action, which undoubtedly will materialize as soon as basic principles are formulated by highly placed authorities.

The closing of large munitions plants and the telescoping of other contracts began to be reflected in the steel industry last week when open hearths went down through lack of orders. Although only nine were known to be out Tuesday for this reason, others were not producing at their peaks and the general feeling was that additional furnaces were likely to be closed. Operating under tight governmental control, steel producers are unable to pick up additional business freely or to take steps which they might normally adopt.

While labor has lodged vigorous complaints, Washington is not fully prepared to open civilian goods production quickly on a large scale because other factors are interfering with such a simple resolving of the complicated production picture.

The easy relationship between steel supply and demand, which has no direct connection with rumors about a possible early ending of the war, finds only flat rolled material continuing to be tight for the moment. An excess of ingots exists, so much so that a few contracts have been cut back including those of one new Western producer, and electric furnace alloy steel capacity is far above requirements. The ingot producing Pencoyd Plant of Carnegie-Illinois Steel Corp., near Philadelphia, may close.

Producers who have been granted above-ceiling prices are jeopardized by a possible slackening of orders. Unbalance of the so-called steel "product mix" is likely to be reflected in smaller net profits for a wide share of the industry, a trend which would be accentuated by a wage rate increase.

EVENTUALLY, Washington probably will abolish a number of limitation orders and amend others which control civilian production. CMP will be maintained to govern material distribution. Allocation controls over pig iron and all ferro-alloys with the exception of columbium, tantalum, low carbon chrome and nickel, may be lifted. Direction 2 to order M-21-a, issued recently to force alloy steel orders from open hearths to electric furnaces, will be rescinded. Order M-126, prohibiting the use of steel in 400 types of metal goods, is scheduled for revocation in January.

Some Washington authorities expect that the steel industry will continue to operate over 90 per cent in first quarter of 1944 but if the European war ends by the latter part of January a drop to 70 per cent is expected because of the lag looked for in reconversion and reconstruction.

Steel allocations for locomotives, freight cars and rails for first quarter of 1944 have been increased to 1,564,000 tons from 1,380,000 tons in fourth quarter and 1,200,000 tons in third quarter. Construction of all-steel freight cars is under active consideration at WPB. Automotive replacement parts for civilian use will receive an allocation of 93,000 tons of carbon steel for first quarter of 1944, an increase of 5000 tons.

While the Office of Civilian Requirements was held down to about 160,000 tons of steel for civilian goods for the first quarter, with the possibility of gaining an additional 50,000 tons from idle and excess steel stocks, the Requirements Committee told OCR that it could make a supplementary request. The fact is all claimants were told that the Requirements Committee would consider supplementary requests. OCR may request an additional 200,000 tons if facilities for the manufacture of civilian goods are found to be available by mid-December. This attitude of the Requirements Committee is particularly significant since it would not entertain supplementary requests for material for the fourth quarter.

SAYING that material inventories are about $5,000,000,000 above peacetime levels, and that steel, copper and aluminum are in good supply, Charles E. Wilson, WPB executive vice-chairman, told the Truman Committee last Friday that he was for peace production planning. But he did not think it proper for technical workers to be diverted now from war work for this purpose.

Mr. Wilson said that he thought active steps could be taken, though the war with Germany still continues. He suggested that the civilian goods letup when it came might be for 50 per cent of prior peacetime production of consumer and hard goods.

Prior to the crackup of Germany, Mr. Wilson said that company heads at the manufacturing and distributing levels could get together at WPB to

News Highlights in This Issue

decide on marketing arrangements, models and the amounts of material and labor which could be devoted to the manufacture of peace goods. Orders would be placed tentatively, pending word from WPB.

The improvement in ferro-alloy supplies, partly a reflection of the easier alloy steel situation, is leading to the formulation of stockpiling policies and the adjusting of production. Vanadium and tungsten supplies are comfortable, high carbon ferrochrome never has been much of a problem, and the molybdenum supply is better. Although nickel inventories never have been large, the source of supply is close. The problem of trimming receipts of ferroalloys involves in some cases matters of delicate foreign policy, and it is interesting to note that imports have continued in some cases despite seemingly impossible war conditions.

MUNITIONS production in October registered a substantial gain over September, the WPB index advancing 29 points. Of the six major munitions groups only combat and motor vehicles declined. The past week also brought out the revelation that the Ford bomber plant at Willow Run is "on schedule" and not infrequently is ahead of day-to-day planning. Close to 1500 bombers have been turned out.

Slowdowns have been affecting production of steel. At the Cleveland continuous mill of Republic Steel Corp., output fell from 73,000 tons in September to 55,000 tons produced and sheared in October and the rate this month is equal to 50,000 tons. The plate loss since Oct. 10 is 30,000 tons. On the 12-in. plate cutting line alone production dropped from an average of 69 tons per hr. in September to 37 tons per hr. during the past several weeks.

Unsatisfactory results from iron and steel scrap collections have so disturbed Administration officials that a report has been prepared in the Executive Office of the White House with recommendations for a sweeping change in the government's scrap organization and modification of OPA's price policy.

ODT Granted More Steel; Other Allotments Listed

Washington

● ● ● Following are the allotments of steel in net tons approved by WPB for 1944 first quarter production with comparable tonnages granted for the 1943 fourth quarter:

(In Thousands of Tons)

Agency	Requested 1st Q.	Received 1st Q.	Received 4th Q.
ODT	1800	1557	1429
Maritime	2950	2430	2596
WFA	907	870	696
Lend-Lease	1154	740	1364
OEW	280	245	223
PAW	448	432	389
Maintenance and Repair	810	800	785

The ODT figure above showing first quarter receipts of 1,557,000 tons includes both carbon and alloy steel but does not include Facility Committee approved tonnage. Pointing out that it had been allotted 1,564,000 tons of carbon steel for the 1944 first quarter, largest amount since it became a claimant agency in the first quarter of 1943, ODT on Monday said that WPB had assigned the priority rating of AA-1 to locomotives, control automotive replacement parts, and trucks and buses and that the railroads received 475,000 tons of replacement rail together with additional steel for accessories. This compared with 400,000 tons of rail for the fourth quarter of this year. (ODT's figure of 1,564,000 tons of carbon steel includes approximately 88,000 tons for construction projects and track accessories as approved by the WPB Facility Committee, heretofore allotted directly to ODT.)

Domestic locomotives will be constructed during first quarter to the full capacity of builders' plants after war needs are met, ODT said. It was stated that ODT was assured by the WPB Requirements Committee that, subject only to unforeseen military requirements, it will receive a minimum annual figure of 1,800,000 tons for new replacement rails for 1944.

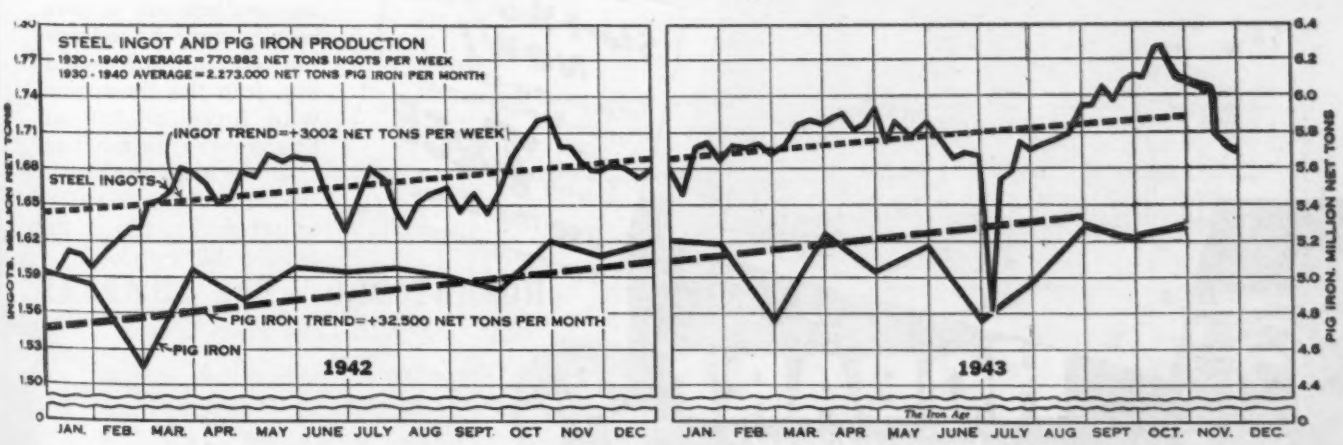
ODT also announced that the matter of the construction of all-steel freight cars is under active consideration by WPB.

Automotive replacement parts for civilian use will receive an allocation of 93,000 tons of carbon steel and related amounts of other materials for the first quarter of 1944 representing an increase of 5000 tons over the fourth quarter of 1943, and the largest amount allotted for this purpose in any one quarter since the beginning of the war.

Negotiations on the white collar contract, governing employees at several Carnegie-Illinois Steel Corp. plants, were deferred last week pending the outcome of the steel union's drive to reopen all of its wage earners' contracts.

The nation's steel ingot production rose this week to 98.5 per cent of capacity from last week's level of 97.5 per cent.

The Iron Age

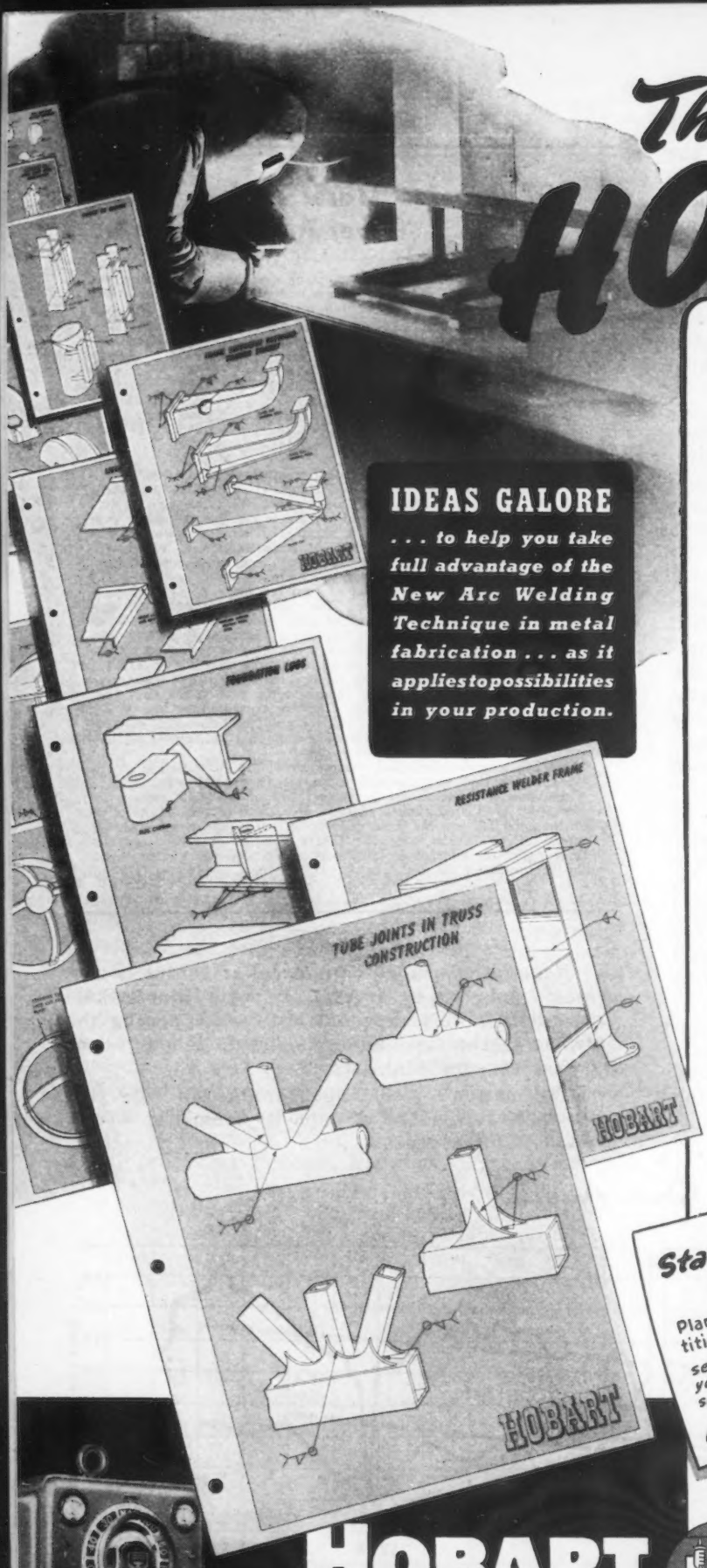


Steel Ingot Production by Districts and Per Cent of Capacity

Week of	Pittsburgh	Chicago	Youngstown	Philadelphia	Cleveland	Buffalo	Wheeling	South	Detroit	West	Ohio River	St. Louis	East	Aggregate
November 18	100.0*	102.0	95.0*	93.5*	88.0*	82.0	101.0	102.0	99.5*	95.0	103.0	112.0	98.0	97.5*
November 25	102.0	102.5	95.0	93.5	89.0	99.5	95.0	99.0	99.5	95.0	105.0	112.0	95.5	98.5

* Revised

The New HOBART



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Closing of More Open Hearths over Nation Predicted; Control Orders Being Overhauled; Rate over 90% Seen in First Quarter

Washington

• • • With an eye to reconversion, reconstruction and cutbacks some steel executives here think that the industry operating rate for the first quarter of 1944 should be somewhere between 90 and 96 per cent, unless the war should suddenly end.

If the European war ends by the latter part of January, the operating rate may fall off to 70 per cent, one Steel Division official says. He also says that no one can perdict with any certainty just how far cancellations will force the production rate down, that the 70 per cent figure is at best a guess.

Another view is that there will be a two or three month lag after the war in Europe stops before the volume of steel production will creep upwards, before the steel demand of converting industries and reconstruction will be felt. Even then, this official says, the volume of steel output may never reach wartime highs.

Already, reduced military requirements are causing shutdowns. Last week, four alloy steel open hearths at Republic Steel Corp.'s Massillon, Ohio, steel plant went down. An official of the CIO-USW local sent an immediate protest to WPB Chairman Donald M. Nelson and to Senator Harry Truman, Democrat of Missouri.

Steel Division officials say that it would do no good to produce carbon steel in the open hearth inasmuch as there are no facilities at Massillon to roll such products as plates or sheets for which there is a lively demand. They say demand does not justify

News of INDUSTRY

merchant bar production at the Massillon works.

This is only the beginning of such shutdowns, it is said. There will be quite a few more facility closings as shifts in the military programs cause lessened demands, for various types of steel products.

As predicted (THE IRON AGE, Aug. 5, page 80) the problems of reconversion are being set on schedule. Some material orders are going to be revoked. A number of limitation orders will be abolished, but the majority which control civilian production will be amended to increase the percentage of civilian goods which can be manufactured.

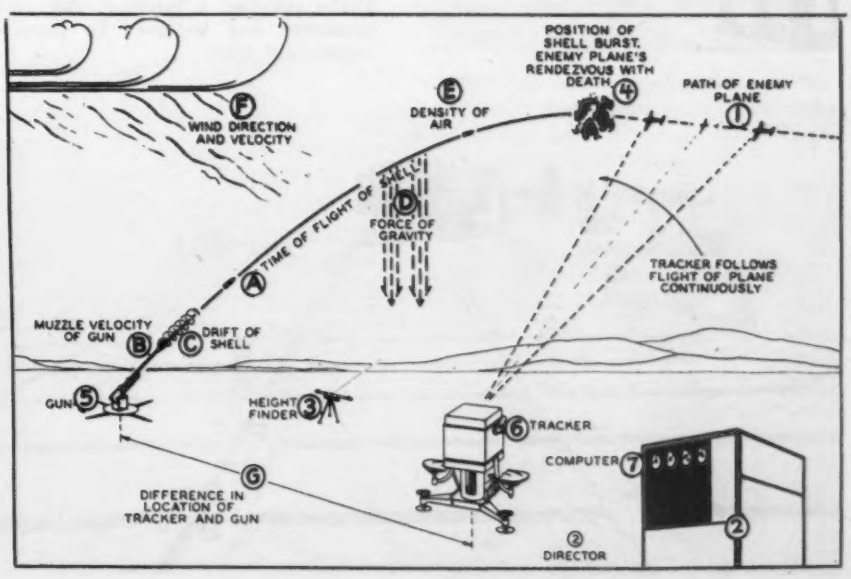
This does not mean that civilian production will be immediately widespread. CMP will be maintained to control material distribution. Depending on the political situation, real reconversion probably will not start until the crack-up of Germany.

Pointers to how WPB feels about the adequacy of metal supplies, munitions and consumer durable goods for war use can be seen by actions which are projected for releasing limitation and material order restrictions.

Mid-war reconversion which may be retarded by the competition among industries, the reluctance of labor to cease war production as exemplified by the Republic case, will also have to run the gauntlet of political fear of the effect of a letting up of civilian production on war morale.

At the material level, the Steel Division has orders in process to abolish allocation controls over pig iron, and all ferro-alloys with the exceptions of columbium and tantalum and low carbon chrome and nickel. Steel Division officials declare that this does

WONDER GUN POINTER: Crowds watch closely as Army men operate the new M9 gun pointer during demonstration at Bell Telephone Laboratories, Murray Hill, N. J. The wonder device directs the fire of anti-aircraft shells, sending them straight at the target. In the foreground is the computer, while the operator truck can be seen in the background. At the right is an explanatory diagram.



not mean that it will no longer be necessary to get ferro-alloys from scrap. Virgin alloys will not be so plentiful that they can be wasted.

While the Office of Civilian Requirements was held down to about 160,000 tons of steel for civilian goods for the first quarter, with the possibility of gaining an additional 50,000 tons from idle and excess steel stocks, the Requirements Committee told OCR that it could make a supplementary request. The fact is all claimants were told that the Requirements Committee would consider supplementary requests. OCR may request an additional 200,000 tons if facilities for the manufacture of civilian goods are found to be available by mid-December.

This attitude of the Requirements Committee is particularly significant since it would not entertain supplementary requests for material for the fourth quarter, when the over allotment to all claimants was about the same as in the first quarter, namely, 15 per cent.

To make supply figures more "realistic" WPB has lopped off approximately 1,000,000 tons from the amount of steel it considers the national supply for the first quarter as compared to the fourth quarter. Broken down, first quarter supply is now placed at 14,470,000 tons of carbon steel, and about 2,200,000 tons of alloy steel.

The demand of 20,670,000 tons is 4,000,000 tons greater than supply in the first quarter. In the fourth quarter demand was approximately 23,000,000 tons.

Other portents pointing to early reconversion moves is the return of $18,000,000,000 to the Bureau of the Budget by the Army and Navy, appropriated for military manufacturers for this year. The Army gave up $13,000,000,000 and the Navy the remainder.

Members of Congress are saying that this indicates that the peak of war production is past and they hint that the descent on the other side is accelerated.

The new cut-backs in small arms ammunition, with slashes as high as 75 per cent on some items, and heavy gashes in the offing for the remainder of the ammunition program underscore the underlying feeling that war on the production front is coming to a rapid close.

The soup-to-nuts steel order, M-126, prohibiting the use of steel in the manufacturing of nearly 400 classifications of metal goods is on schedule for revocation sometime in January, according to WPB sources. Again manpower, materials and plant facilities are going to call the turn of when these articles will once more appear on dealers shelves.

Metal products civilians will get once production is resumed range from ash sieves to work benches.

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Union Demands Idle Furnaces Be Restored "Regardless of Profit"

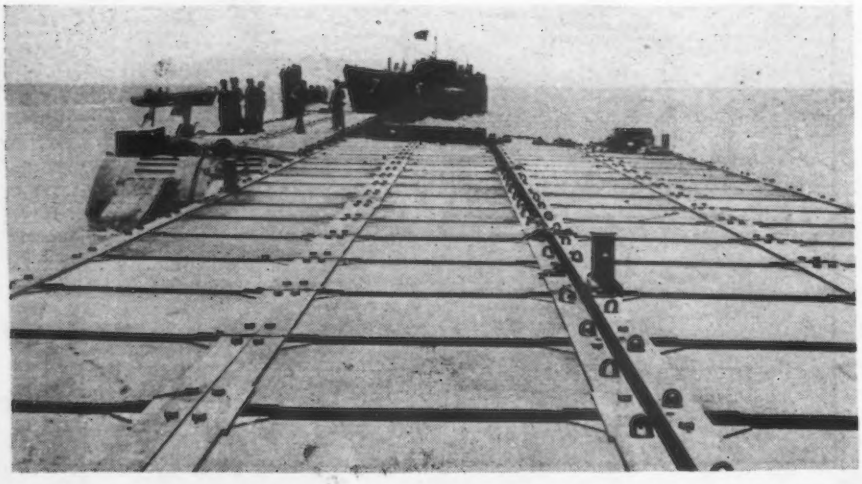
Cleveland

• • • **The CIO** United Steel Workers' local at the Massillon plant of Republic Steel Corp. this week challenged the curtailment of steel production when four of the nine open hearths were shut down. The union requested that the government place these furnaces back in production, "producing their share of needed carbon steels, regardless of profit or loss." Telegrams were sent to WPB Chairman Donald M. Nelson and to U. S. Senator James Truman, head of the committee investigating the war effort.

Republic asserted there was no truth in the union's accusations that the company's action was motivated by paramount concern over profits. A company spokesman stated that "the steel situation is such that open hearths are being shut down all over the country and the government already has more steel than it has any use for."

The Massillon district of Republic is primarily a manufacturer of alloy steels, and orders for alloy steel have been far below capacity for some weeks. The nine open hearths at the plant have been in operation for the preparation of metal for electric furnace refining. The duplexed metal is partially refined and alloyed in the open hearths and completed in the electrics, thus speeding up the complete operation considerably. The open hearth capacity of the plant runs over 100,000 tons per year.

Meanwhile, operations have been cut at other Republic plants at Cleveland and Buffalo. In a statement to employees at these other plants, as well as to the public, Republic Steel Corp. announced that the closing down of the open hearth at these local plants is a serious matter and has been under discussion with the War Production Board for some time. No employees



PONTOON PIER: The steel pontoon gear carried on the side of the LST'S permits the boat to operate in various depths, and to make closer landings possible. When rocks prevent a landing, the steel pontoons can be used to form a temporary pier.

Rudy Arnold Photos

would be laid off, however, it was stated.

At the Cleveland plants of Republic, open hearth production dropped about 20 per cent. Republic reported that "due to the high rate of steel production and as a result of recent labor stoppages at finishing mills (the strip mill strike), steel production and finishing capacity became out of balance and a surplus of ingot and semi-finished steel accumulated. Temporarily, open hearth furnaces have been taken off but will be put back as soon as required."

Simultaneously, the Youngstown district reflected a slackening of steel production. Five of Republics open hearths in this area were down, with only one down for repairs. Resumption of full operations is expected soon in this area.

It was stated that the reduced demand is the result of an adjustment of steel consumers' inventories and the readjustment of allocations of tonnages under the Controlled Materials Plan.

That the union trouble at Republic is part of the large scale national picture of labor agitation appears to be of little doubt.

While it can be argued that the open hearths at Massillon could be used in making carbon steel, there is the raw materials situation to consider here. Republic blast furnaces in that area have for many months been producing alloy iron, which is quite satisfactory in alloy steel production. However, non-contaminated scrap at this point is just non-existent. In fact, alloy scrap has piled up to the point that Republic might be quite willing to sell large tonnages just to get rid of it.

The slowdown at the Cleveland strip mill has resulted in a loss of more than 30,000 tons of ship plate since Oct. 10.

The six weeks' slowdown followed directly the return to work of employees at the mill after an illegal two-day strike that ended Oct. 10.

John C. Virden, WPB regional director here stated that the WPB is "deeply concerned" over a slowdown in the production of plates at the Republic Steel Corp. continuous mill which has caused tonnage which stood at 73,000 tons in September to drop to 55,000 tons in October and is continuing at the rate of about 50,000 tons so far this month.

C-I to Abandon Pencoyd Steel Plant

Philadelphia

• • • The easier situation in steel ingots is expected to result in the closing down of the Pencoyd Plant of Carnegie-Illinois Steel Corp. sometime in the near future, possibly around the first of the year. Nothing but ingots have been produced there, fabricating equipment having been scrapped sometime ago.

The plant has already been sold on the basis that demolition will begin as soon as steel is no longer required. It is understood that changes in Lend-Lease requirements, as well as the availability of steel ingots from other locations, will make it unnecessary in the near future to require further manufacture of steel ingots.

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Excess Tonnage a Chief WPB Problem

Pittsburgh

• • • There is, this week, a definite excess of steel, and although the tonnage is a small percentage of total production it represents one of WPB's No. 1 problems.

Some steel companies already have cut back open hearth production because of lack of sufficient orders. This trend will continue, unless the WPB can move quickly enough to find new channels for excess ingots and semi-finished material.

In view of the limitation orders, and since the steel industry is operating almost entirely under the control of WPB, it seems likely that slight declines in steel output can be expected in the future. Some of these already are apparent this week.

There is no relationship between the present balanced steel situation and rumors of early ending of the war. The balanced steel situation is the result of unprecedented production by the steel industry, to such an extent that the only tight item at present is flat rolled material. Plates are expected to be easier by the first quarter of 1944 which will allow more space for sheet production. Cut-backs in total flat rolled demand over the next few months are a probability.

Alloy steel capacity at the present time is exceeding alloy steel demand. Electric steel capacity, even with the help of orders switched from the open hearths, will by the first of the year be operating somewhat below 100 per cent of capacity, according to current outlook.

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Cancellations Unbalance Product Mix

Pittsburgh

• • • The increase in the number of cancellations in various governmental projects is bringing about an unbalance in so-called steel "product mix." This development is expected by some steel officials to be reflected in smaller net profits during the fourth quarter this year and in 1944, unless civilian requirements are expanded at a greater rate than is now anticipated.

Some steel companies which had prime contracts have had these cancelled. Reasonable profits from these contracts had enabled many steel companies to make an over-all profit, even though some steel products, in great demand, produced very little if any margin. With these primary contracts being cancelled, and with demand for some of the more profitable steel items diminishing, the "product mix" may soon show a more preponderant tonnage in those items on which the margin is relatively small.

A wage rate increase, which is expected in most circles, will accentuate the steel industry profit situation. Some steel officials privately believe that profits in 1944 may be somewhat less than in 1943. For this reason, it is expected that the entire steel price problem will be wide open sooner than had been expected. In the last analysis, the decision of the OPA, which has been granting more individual price relief requests, will be the determining factor in the 1944 steel industry financial picture. Incidentally, some of the individual increases, made recently, for high cost ingots, billets, rails, etc., may now mean little to the company which obtained them, for the reason that the same products may be purchased cheaper elsewhere. It is believed that some of the lend-lease ingots, which were commanding a higher price than the standard quotations, have been cancelled recently.

Surplus Steel Closes Three Open Hearths; Union Charges Excess Capacity Is Cause

Buffalo

• • • **Only six of the nine** open hearths at Republic Steel Corp. are being operated because of a surplus of ingots and semi-finished steel. The accumulation is the result of high rate of output plus recent work stoppages in the finishing department.

District Plant Manager Frank C. Farrell said no definite time could be fixed for relighting the idle units. Eight open hearths were being operated regularly, and occasionally all nine were under heat, up to Nov. 4 when a walkout in the blooming mill led to a complete shutdown of ingot production for one week.

No reduction of employment is involved in the open hearth curtailment as men will be offered jobs in the finishing mills. Also by spreading work among the six going furnaces a five-day week could be adopted to avoid layoffs, Farrell said.

Taking exception to Farrell's reference to the recent work stoppage, Joseph T. McNichols, district director of the United Steelworkers, asserted Republic's Massillon plant has closed down four of nine open hearths although there had been no labor trouble there. McNichols declared a Republic executive had said in Massillon that "open hearths are being shut down all over the country because the government has more steel than it can use."

Speedy Settlement Approved by Council

Washington

• • • **The Federal Advisory Council** of the Federal Reserve System, in a joint resolution with the Board of Governors, went on record last week as favoring speedy and final settlement of terminated contracts.

Summed up the resolution makes the following suggestions:

1. That war contracts which are terminated must be settled promptly and finally by negotiated agreements between the contractor and the procuring agency of the government which negotiated the original contract.

2. That settlements so negotiated should be final and not subject to review by any other agency except for fraud.

3. That if settlements of terminated contracts when negotiated by the procuring agencies are not final, or if they are made subject to subsequent audit, credit for working capital needed for reconversion after the war may, in many cases, be unavailable until the settlement does become final.

4. That Congress should relieve contracting officers who negotiated settlements from personal responsibility, except for fraud.

5. That Congress should enact legislation providing more adequate means of interim financing of contractors.

6. That appropriate plans should be made in advance for the prompt removal of surplus government material and facilities.

Further developments in the contract termination picture include views expressed by high Army sources in Washington last week, which in effect say that the Army expects industry to bear the brunt of termination, since it is believed that government personnel is inadequate to handle the job.

Ore Consumption Marks Third High

Cleveland

• • • **For the third time in history, the steel industry passed the 7,750,000 gross ton mark in ore consumption, with an October figure of 7,750,682 tons. December, 1942, and January, 1943, were the only two other months that the mark was reached, both of these months exceeding the October, 1943, consumption slightly. Total ore consumption of 1943 was 74,009,064 gross tons; in 1942, 76,335,682 tons.**

Only 48,614,006 gross tons of ore are on hand at the furnaces and on the Lake Erie Docks, a gain of about 4.775,000 tons. The gain during September was about 5,258,000 tons.

Total blast furnaces in October were 193, one more than during September due to a new Republic furnace at Cleveland. There are 12 out of blast, 10 in the United States and two in Canada, bringing the number of furnaces producing iron to a total of 181.

WPB to Schedule Aircraft Components

Washington

• • • **WPB has found** its program of scheduling critical components very successful, as was the case in conflicting programs like rubber, octane gasoline and escort ships. Later that method of breaking bottlenecks was extended to cover aluminum aircraft extrusions. WPB has issued M-360, providing a program of scheduling of aircraft components. Components, in this new order, include any component, part or sub-assembly to be physically incorporated into heavier-than-air or lighter-than-air aircraft.

The order will be administered by the Aircraft Scheduling Unit, acting for and under the direction of the Aircraft Resources Control Office on behalf of WPB.

When filed by the supplier, the shipping schedule automatically becomes a "frozen schedule" within the meaning of Priorities Regulation 18 for the number of months stated in the instructions. The supplier must then schedule his production and make his deliveries in accordance with that frozen schedule.

Qualifications for Return To Civilian Products Are Rigid

Cleveland

• • • **Manufacturers planning** resumption of production of normal peace time articles and considering appeals from various WPB limitation and materials orders for this purpose must meet several important requirements before they can expect help from the War Production Board.

In view of some war production cutbacks, made necessary because of shifting strategy on the war fronts, some manufacturers have shown interest in returning to civilian production. Relief from WPB orders will be given under the following conditions:

1. When materials are available in frozen or excess inventories. 2. When the manufacturer is located in an area where the labor supply is plentiful. 3. When the work is needed by the manufacturer to keep his skilled employees between war contracts.

Early Lifting of Direction 2, Governing Alloy Steel, Predicted

By DON JAMES
News and Market Editor

• • • **Alloy** steel production is approaching another turn. As demand for carbon steel seems to be leveling off, it is logical to expect that Direction No. 2 to Order M-21-a, issued in late October, transferring to electric furnaces seven specific types of alloy steel classified by end uses, will be rescinded long before the expiration date of March 31, 1944.

With the completion of the electric furnace building program early next year, it is also logical to expect that electric furnaces will have idle capacity in the first quarter of 1944, unless substantial new programs are inaugurated which are now unforeseen.

A lower rate of alloy steel production no doubt will be reflected in an increase in ferro-alloys supply and also alloy scrap. The latter is already being generated at a higher rate than consumption.

What is behind all this shifting that is going on in alloy steel? Early in the war the shortage in alloy steel was so desperate that open hearths were diverted from carbon steel to increase the supply. Special facilities for handling alloy steel were provided in what were formerly plain carbon steel plants. A number of structural mills were diverted for this purpose. In addition to providing more open hearth capacity for alloy steel, large new electric furnace units were put under construction. Some of these units are already in production.

Alloy steel production reached its peak in March, 1943, and then started to decline month by month. Finally in September some electric units were idle for lack of orders, while at the same time capacity for carbon steel was less than the demand. Therefore the War Production Board, Steel Division, began transferring orders temporarily from open hearths to the electric units, backing its action by the issuance of Direction No. 2. Now it appears that Direction No. 2 will be cancelled after a short existence.

The reasons for the changes are not too involved. Early in the war, Claimant Agency demands were tremendous and makers of war goods were not very conscious about inventories. Stated requirements included such excess tonnage because contractors and agencies felt it necessary to include safety factors. In these demands were very large requirements for products of electric furnace quality. These demands were of such magnitude and importance, that it was the considered opinion of many minds that a greatly enlarged electric furnace capacity would be necessary.

Construction of the new electric furnace units lagged, due to preference being given to other urgent programs, notably rubber, high octane gas, aluminum, etc. Late in 1942 it became apparent that the increasing needs for high quality electric furnace steels for aircraft, bearings, etc., would not be met because the new capacity was not coming along as fast as the steel requirements. In order to satisfy their demand many products furnished by the electrics were switched to open hearth. A program of type testing for proper application was pushed vigorously. Consumers became educated to the use of open hearth alloy steel and now regardless of electric furnace capacity becoming available, many users will probably continue the use of the open hearth product, where it has proven satisfactory.

As the war entered new phases and it became apparent that ample stocks of certain kinds of equipment had been built up, military requirements began changing and many contracts were terminated or cut back. Simultaneously, CMP with its 60-day inventory limit, began to put a damper on some inflated requirements. Later came good news from the war fronts which also helped deflate inventories.

The situation as of the present was well summed up last week by the Aircraft Scheduling Unit at Wright Field when it revealed that unused allotments were returned by the aircraft industry in fourth quarter to the tune of 100,000 tons of steel (plus 11,000 tons of copper and 42,500 tons of aluminum).

An increasing demand for carbon steel along with the diversion of some open hearths to alloy created a very tight situation some months ago which continued until recently. As alloy production fell available open hearths were quickly diverted back to carbon steel, and more recently as electric capacity became available, they were able to relieve the backlog by the diversion from open hearths to electrics. Certain programs, very important to the war effort, have thus been able to secure vitally needed carbon steel during this quarter, which otherwise could not have been produced before the first quarter of 1944. During the fourth coal strike, certain plants in the South requiring carbon steel had to have aid from Northern producers and this was eased by switching open hearth alloy orders to electric units.

Figures of the American Iron and Steel Institute show that shipments of carbon bars have gained since last March and carbon semi-finished also is greater. Electric furnace facilities helped enable these gains along with the lessened demands for alloy steel generally over the past few months.

Therefore, while demand for electric furnace alloy steel has dwindled below early expectations, the enlarged production capacity has proved extremely valuable.

The problem for 1944 is heightened by the fact that about 100,000 ingot tons per month of new electric furnace capacity will be available. Total electric furnace capacity in early 1944 will be in the neighborhood of 470,000 ingot tons per month. Capacity at the start of the war was only about 150,000 tons per month.

Stated requirements for the first quarter of 1944 are almost as great as in the third and fourth quarters of this year, but these requirements are built up months in advance and are vastly greater than the actual orders reaching the mills. It is doubtful if actual orders placed for first quarter 1944 delivery will reach the fourth quarter figures.

The WPB Steel Division has no intention of forcibly keeping up the diversion of orders.

NORTHWEST PIPELINE: These welders are working on construction of the pipeline that will carry oil from the Mackenzie River on the rim of the Arctic Circle to the Alcan Highway at Whitehorse. The pipeline is on the surface and is being carried over some of the most rugged terrain in the Northwest.

25 States Used 90% of Steel Before War

• • • **In connection** with Congressional proposals to duplicate the steel industry's capacity in all of the states which are not favored now by sizable steel plants (see THE IRON AGE, Oct. 14, page 120) it is interesting to note the relationship between capacity and steel consumption in the 48 states prior to the war.

The 25 states having 100 per cent of the steel capacity in 1937 consumed about 90 per cent of the steel made that year. Eight states with 81.2 per cent of the capacity consumed 59.7 per cent of the steel. The eight states are: Pennsylvania with 32.6 per cent of the capacity consumed 17.0 per cent; Ohio with 22.2 per cent of the capacity consumed 12.1 per cent; Indiana with 12.7 per cent of the capacity consumed 4.5 per cent; Illinois with 9.2 per cent consumed 11.3 per cent; New York with 4.7 per cent capacity consumed 5.7 per cent; Maryland with 3.7 per cent consumed 1.7 per cent; Alabama with 3.2 per cent consumed 1.2 per cent; Michigan with 2.9 per cent of the capacity consumed 16.2 per cent of the steel. The tabulation of all states is given in detail in the table at left.

J. H. Van Deventer, President and Editor of THE IRON AGE, has written an editorial on the subject of the Congressional proposals, which appears in this issue.

State	No. Plants	Annual Capacity at start of 1937 net tons	Fin. and Semi-Fin. Steel Shipments Received 1937 (thousands of net tons)
Pennsylvania	45	25,273,582	6,763.8
Ohio	23	17,141,147	4,801.6
Indiana	5	9,868,518	1,796.1
Illinois	9	7,163,403	4,504.0
New York	9	3,617,713	2,286.9
Maryland	2	2,834,796	662.5
Alabama	4	2,462,880	486.1
Michigan	3	2,234,400	6,438.5
West Virginia	3	1,859,200	561.9
Kentucky	2	1,003,968	212.5
Colorado	1	991,244	237.9
California	6	808,819	1,830.6
Missouri	2	488,902	586.1
Delaware	1	423,360	37.9
Minnesota	1	336,000	363.3
New Jersey	2	247,184	930.2
Massachusetts	1	212,800	633.4
Washington	2	173,600	253.4
Georgia	1	153,485	182.8
Connecticut	1	134,400	326.5
Rhode Island	1	57,120	107.6
Oklahoma	1	56,000	246.1
Virginia	2	5,264	226.0
Texas	1	4,256	1,397.7
Dist. of Col.	1	2,016	53.1
Total	129	77,554,057	35,926.5
Wisconsin			1,296.3
Tennessee			464.7
Louisiana			376.5
Kansas			310.7
Iowa			237.5
Oregon			154.0
Utah			130.3
North Carolina			116.1
New Mexico			109.2
Florida			98.1
Maine			90.9
Nebraska			85.8
South Carolina			77.6
New Hampshire			51.6
Arizona			46.6
Mississippi			43.3
Montana			40.5
Arkansas			36.2
Wyoming			20.9
Vermont			18.1
Odaho			16.1
South Dakota			11.3
Nevada			8.0
North Dakota			7.3
Total			39,774.1

Capacity figures from American Iron and Steel Institute.

Data on shipments by Marion Worthing for National Resources Planning Board.

Steel Warehousemen Hear WPB-OPA Heads

Chicago

• • • **No hope that increased** tonnages of hot and cold rolled and galvanized sheets will be available to warehouses during the first quarter of 1944 was held out by J. R. Stuart, chief of the warehouse branch, steel division, WPB, speaking before the annual meeting of the Steel Products Warehouse Association, Inc., last week.

Members of the association, composed of warehouses dealing principally in flat rolled products, heard Stuart state that if new finishing mill capacity expected to be in production by the end of the first quarter was devoted to plate production, some reconversion of sheet and strip mills to those products might be possible. He emphasized, however, that requirements of the Maritime Commission, Navy, and other claimant agencies, now necessitate that nearly one-fifth of all steel produced go to steel plate production. If sheet and strip mills are reconverted—which is still problematical—it would logically follow that a greater volume of seconds would be available to the trade, he said.

Recent and impending changes in War Production Board and Office of Price Administration regulations were discussed by officials of those agencies. Stuart said that Form WPB 2888, steel warehouse report under Order M-21-b-1, henceforth would be filed on a quarterly rather than monthly basis, and that the report would not be due until the fifteenth, rather than the tenth, of the month, starting with January 15. On alloy steel, segregation by alloy will be eliminated. An amendment to Order M-21-b-1 is being considered which would make it possible for warehouses to purchase items for which they have no base tonnage from idle or distressed stocks. It is also proposed to publish a direction facilitating operations of middlemen acting as agents for owners or buyers of distressed steel. The middleman would not be allowed to take title to such steel, nor would he be classed as a warehouse.

Participation of such intermediaries in redistribution of idle and distressed steel was discussed at greater length by T. S. Fitch, special assistant on redistribution problems for the WPB steel division, who estimated that 1,500,000 tons of steel are now available for redistribution, and that the end of the war might easily find 10,835,000 tons of surplus steel inventories.

Some idle and excess steel is going into foreign markets, Fitch stated.

E. L. Wyman, head, warehouse and jobbers section, iron and steel price branch, Office of Price Administration, said that consideration was being given to amending the provisions of Revised Price Schedule 49 which cover the resale of secondary and reject iron and steel. Resale price of such items now is based on the "lowest combination principle," using schedules established for listed cities, each having a different base for each product, plus freight and extras as set up in Appendix F to Schedule 49.

Officers elected were: President, W. E. Thoreson, president, Great Western Steel Co., Chicago; first vice-president, Sol Friedman, president, Reliance Steel Corp., Chicago and other cities; second vice-president, Joseph Gendelman, president, National Sheet Steel Co., Detroit; secretary, Donald C. Lott, president, Tin Mill Products Corp., Pittsburgh; treasurer, Joseph E. Lavine, Union Steel Supply Co., Warren, O.; trustees-at-large, Myron Hokin, T. H. Patterson, J. D. Finnegan, and Sol Friedman.

White-Collar Wage Demands Delayed Pending CIO Drive; $135 Minimum Sought

Pittsburgh

• • • **Negotiations on the** white collar contract, covering employes at several Carnegie-Illinois Steel Corp. plants, were deferred last week pending the outcome of the steel union's drive to reopen all of its wage earners' contracts. There has been no let-up, however, in the USWA's drive to sign up white collar members. The drive has extended, as predicted in THE IRON AGE, Nov. 4, Page 97, to other large steel companies.

Last week, statisticians and international officials of the steel workers' union met here to map out a tentative plan for the "full dress" meeting, to be held here Nov. 30 and Dec. 1. District union officials, at that time, will meet with Phillip Murray and his aides in order to determine what sized increase will be sought and what method will be used to reopen present wage contracts.

The deferment on the white collar negotiations is believed to have materialized in order to secure as much as possible for these employes, at the same time pressure is put on to obtain a base rate increase for wage earners. It has been learned that one of the demands put forth by the USWA some **weeks ago, for** white collared workers, included a minimum salary of $135.00 a month and a six months' revue of all salaries. At the time negotiations were temporarily halted on the white collar question, both sides were considering counter-proposals.

It is expected, here, that Murray's demand for higher wage rates will, a short time after it is made, find its way to the lap of the War Labor Board. The white collar contract negotiations will cover many more items than salaries alone.

•

Aluminum Workers' Drive

Pittsburgh

• • • **The CIO Aluminum Workers** of America last week announced plans for a drive for a straight 15c. an hour increase at the Aluminum Co. of America plants. The raise will be asked for in part cash and in part war bonds.

According to information here, this is approximately 19 per cent over the present rate for the industry, as established by the War Labor Board, which froze the basic pay for labor at 78c. an hour, the same scale which covers the steel industry.

The United Steel Workers' office declined to comment as to whether this same 15c. boost will be asked for from the steel industry.

Observers here believe, however, despite the lack of comment from the USWA that the steel wage figure will probably be around 15c. an hour or more—at least for bargaining purposes.

The cash portion of the proposed Aluminum wage increase is said to be designed to offset higher costs, while the war bond portion, according to the union, is to provide a cushion during the post-war adjustment period.

Use of Ratings Revised in PR No. 3

Washington

• • • **Rules governing** the use of preference ratings have been clarified by a complete revision of Priorities Regulation No. 3, which simplifies the regulation and makes some changes in substance, WPB announced last Friday.

One important change permits the use of preference ratings to get material processed, even though the person using the rating intends to use the material himself rather than deliver it, or incorporate it into a product which will be delivered to someone else.

Interpretation No. 7 to Priorities Regulation No. 3, announced at the same time, indicates that preference ratings may not be used to get materials processed into controlled materials forms or shapes by either a producer or warehouse, inasmuch as preference ratings may not be used to purchase the controlled materials themselves.

The interpretation also points out that, with certain limited exceptions, manufacturers are not permitted to make allotments or furnish controlled materials to Class B product producers for processing, and that, consequently, no preference rating can be used to get such processing done.

While persons who have been assigned a rating to get materials may use it to get the use of a controlled materials producers facilities to have material processed into other than controlled material forms and shapes, rated orders for the use of a controlled materials producers facilities must not interfere with the acceptance, production, or delivery of orders for controlled materials which the producer is permitted to fill under CMP Regulation No. 1.

Interpretation No. 4, as amended Nov. 18, 1943, to Priorities Regulation No. 1, announced at the same time, also points out that rated orders must not interfere with the acceptance, production and delivery of controlled materials orders.

The amended version of Priorities Regulation No. 3 also prohibits persons to whom preference ratings have been assigned for materials to extend such ratings to get containers or closures to pack the material. Neither may such a rating be extended to get material for the improvement, expansion or construction of plant or to get machine tools or other items which will be carried as capital equipment or MRO on the purchasers' accounts. Such ratings may not be extended to obtain business machines, whether such machines are purchased or leased.

However, ratings may be used for purposes other than replacing inventory after three months from the time the rating could first have been used has elapsed, which represents a change in the regulation, since the three-month limitation previously applied to extension of ratings for any purpose.

List B of the Regulation, indicating items which may not be purchased with the use of blanket MRO ratings, has been completely revised to arrange the items alphabetically in view of certain additions which have been made.

•

Galvanized Products Rated Class A Products

Washington

• • • **Galvanized steel** products in controlled material form are Class A products when sold by a galvanizer who is not a steel producer, WPB has announced in Direction 38 to CMP Regulation 1. When sold by a steel producer, such products are controlled materials, and when sold by a distributor, they are controlled materials regardless of who produced them.

CMP Hailed as Means of Limiting Claims and Speeding Termination Payments

New York

• • • **The Controlled Materials Plan,** praised by industry for its efficiency in production and inventory control, is now presented as a means of speeding contract termination settlements. The same controls which hold inventory to a minimum working level and maintain production at levels consistent with inventories and material allocations are pointed to as being capable of also speeding settlements on termination of contracts through limiting the amounts of material either in inventory or in process to a minimum and readily accountable level. Thus computation of claims and auditing of them is said to be assisted.

This new version of the capabilities of CMP was presented by Major W. R. Comber of the Army Ordnance Department, Washington, before the American Management Association here last week. Citing a typical instance, Major Comber related a situation which occurred when tank contracts were cut back in August. He said that when the government terminated the contracts of several large tank facilities the production level was reduced about 70 per cent over planned quotas. Some previous notice to subcontractors gave them an opportunity to take in other work which helped tide them over the cut-back. At the same time the program was left "long" on CMP allotments. These allotments, representing raw materials mostly, were not considered in termination claims but were re-allotted to other consumers on programs extending through the first quarter of 1944. Thus only those materials beyond the March quarter of 1944 and those materials in actual process at the time of termination were a subject of claim. The contract terminations totaled about $40,000,000, the Major said.

In addition to the production and inventory controls which minimize the amounts of material to be considered in termination claims, CMP is also credited with having provided accounting and record systems which will be helpful in quickly establishing the authenticity of claims both on the part of contractors and in the eyes of procurement agencies.

Summing up the objects of the Army Ordnance Department's production control procedure, Major Comber pointed out the following: (a) facilitated contract adjustments through minimization of materials obsolescence and claims for government reimbursement; also quicker presentation by prime and subcontractors of their inventory status records; (b) rapid and economical effectuation of design changes; (c) greater turnover for a manufacturer with less of his capital invested in excessive work in process and finished inventories; (d) balanced output of components; (e) improved operation under CMP for both prime and subcontractors, and (f) conservation of materials.

Triple Aim Seen in CIO Wage Drive

New York

• • • **Phillip Murray's** all-out drive to increase wages and break the "Little Steel" wage formula is believed here to have a triple purpose. The drive is thought to be designed to save CIO face, increase wages and gain membership simultaneously.

Evidence of this motive was seen in CIO literature passed out freely in the yards of one large steel producer last week. In effect the pamphlets instructed the men that higher wages were being sought; that the "Little Steel" formula was of no importance; that possible union-crucifixion through the press was to be disregarded. Thus stabilization hopes and the war effort were minimized:

From the membership angle, the pamphlet is alleged to have stated that in this particular plant there were at least 1500 workers who would come along for a free ride to higher wages without union membership. This situation was pointed out as needing correction. Apparently a membership drive is to be included in the plans.

The face-saving appears required considering the earth-shaking gains recorded by John L. Lewis for his miners. Murray is believed to be saving face for his organization by putting on a drive at this time and also taking advantage of a precedent hard won by Lewis.

Some observers have pointed out that Murray could become a national hero by standing by the stabilization program and throwing the weight of his 900,000 members into the fight for rectifying actions which would eliminate the need for further wage increases. This action, however, it was pointed out, would neither bring financial increases to his men nor membership to his fold and thus was extremely unlikely.

• • • October pig iron production increased to 5,257,988 net tons from the September production figure of 5,179,479 net tons, although output for October was 98.1 per cent of capacity compared with 99.7 per cent in September. Ferromanganese and spiegeleisen amounted to 65,750 tons, 19,713 tons higher than in the previous month.

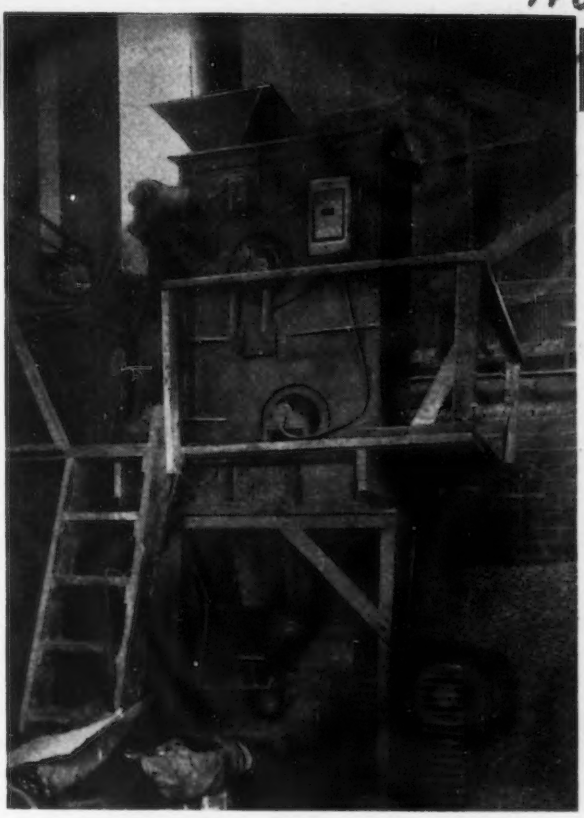
OCTOBER BLAST FURNACE PRODUCTION—NET TONS

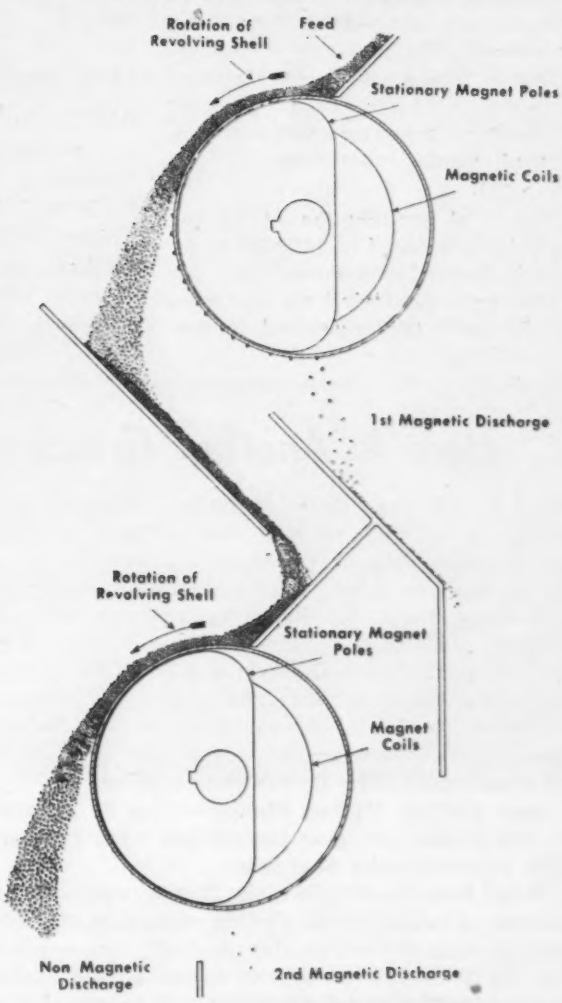
Source: American Iron and Steel Institute

	PIG IRON		FERRO-MANGANESE AND SPIEGEL		TOTAL		
	Current Month	Year to Date	Current Month	Year to Date	Current Month	Year to Date	Percent of Capacity Current Month
DISTRIBUTION BY DISTRICTS:							
Eastern	1,006,151	9,543,916	22,592	194,896	1,028,743	9,738,812	94.1
Pittsburgh-Youngstown	2,245,522	21,014,133	20,069	182,651	2,265,591	21,196,784	101.7
Cleveland-Detroit	538,222	5,145,005	.....	.....	538,222	5,145,005	103.4
Chicago	1,119,236	10,965,206	.....	.....	1,119,236	10,965,206	100.5
Southern	256,919	3,221,844	23,089	167,841	280,008	3,389,685	74.5
Western	91,938	789,442	.....	6,141	91,938	795,583	95.4
TOTAL	5,257,988	50,679,546	65,750	551,529	5,323,738	51,231,075	98.1

During 1942 the companies included above represented 99.8 percent of the total blast furnace production.

For Sharper, Higher Capacity Separation of *NON-FERROUS SCRAP* the Dings DOUBLE DRUM Separator





Above—diagrammatic illustration of operating principle of Dings double drum separator.

IN many plants separating aluminum and other non-ferrous machine shop scrap, the Dings double drum separator is proving of great value in effecting cleaner separations of increased tonnages. This is one of a complete line of Dings drum type separators including agitating drums for separating badly entangled scrap. Write for Catalog 660 giving full details, capacities, etc.

DINGS MAGNETIC SEPARATOR CO.
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Dings MAGNETIC SEPARATION HIGH INTENSITY

Scrap Stocks Failing; Consumption Drops

• • • **Domestic stocks** of iron and steel scrap at consumers', suppliers', and producers' plants at the end of September, 1943, approximated 6,613,000 gross tons, representing a decrease of 2 per cent from the 6,778,000 tons reported on Aug. 31, according to a statement released by the Bureau of Mines. This decline was occasioned by decreases of 2 and 3 per cent in consumers', suppliers' and producers' stocks, respectively. Thus while suppliers' and producers' stocks on Sept. 30 amounted to 1,139,000 tons compared with 1, 169,000 tons at the end of August, consumers' stocks were 5,474,000 tons and 5,609,000 tons, respectively. The majority of the decrease in total stocks was contributed by a decline of more than 3 per cent in stocks of purchased scrap at consumers' plants (approximately 140,000 tons).

The total consumption of ferrous materials amounted to 9,228,000 gross tons in September, representing a decline of approximately 1 per cent from the 9,306,000 tons consumed in August. This decline was entirely due to the shorter month since the average daily melt increased 2 per cent over that in August. Although the total consumption of purchased scrap remained approximately the same in September as in August, stocks of this material at consumers' plants showed a decline of 3 per cent. This would indicate that shipments of scrap to consumers by suppliers and producers are insufficient to meet current requirements. While total consumption of home scrap and pig iron in September showed individual declines of 1 per cent from that used in August, stocks of pig iron gained 2 per cent, whereas stocks of home scrap remained approximately the same.

U. S. Steel Signs Contract

Kearny, N. J.

• • • **Renewal of the labor** contract between U. S. Steel's Federal Shipyards and Local No. 16 Industrial Union of Marine and Shipbuilding Workers of America CIO was announced this Nov. 22 by Lynn H. Korndorff, Company president.

Byrnes Confirmed in Demobilization Job

Washington

• • • **Bernard M. Baruch** is reported to have said recently that the job of industrial demobilization is in the hands of War Mobilizer James F. Byrnes who has been given these problems to deal with by the President. Other war agencies are expected to have their places in whatever post-war reorganization is decided upon.

Administration officials say that Congressional statements that the duty of terminating contracts, disposing of surplus materials and renegotiating contracts when the war ends will be reposed in one agency may be premature from the White House viewpoint.

Meanwhile, Charles E. Wilson, WPB Executive Vice-Chairman whose resignation was reported last week, has been persuaded by Justice Byrnes to remain in his present position for a while longer. Mr. Wilson is still determined to leave Washington as soon as the President will relieve him of his duties, WPB spokesmen say.

Here Is Another Group of Seized Metalworking Patents

• • • **Weekly examination** of the lists of seized patents as they appear in THE IRON AGE will prove profitable. This can be done at the reader's leisure. Here are examples showing why a close watch is recommended:

Machine Tools—Multi-spindle automatic lathes and milling planers have appeared under the Metalworking class; several machine tools have appeared under the Abrading class; attachments have appeared under the Turning class, under Metalworking, Abrading and so on. These and other machine tool patents bob up occasionally under diverse classifications.

Gear Cutting, Milling, Planing—Class 90 is devoted to this subject, yet gear lappers and teeth generators have appeared under Abrading.

Metal Foundry—While Class 22 is an extensive compilation of patents relating to die casting, molds, ladles, sand-packing devices, casting methods, etc., a process for the protection of colored layers on die castings appeared under metal treatment. A process for pig iron recarburization appears under Metal Tools. These are merely random examples.

Steel Industry—Ingot molds have appeared under the Metal Founding class; a slag cooling device under Mills; coke oven rams under Material Handling; method of dealing with pickling acid under Chemistry; other patents under Metallurgy.

(Note—The above references include some from the list of seized patent applications printed in this magazine July 8.)

Patents seized by the U. S. Alien Property Custodian are available to large and small firms for use now and after the war ends, for a comparatively small fee. You must obtain a license. Here is what has been printed in previous issues of this magazine:

July 8—Lists of seized patent applications.
Nov. 4—Up-to-date explanation of how to proceed to obtain a license; Class 205, Metal Drawing; Class 185, Motors; Class 7, Compound Tools; Start on Class 22, Metal Founding.
Nov. 11—Additional explanatory material; Conclusion of Class 22; Start upon Class 153, Metal Bending.
Nov. 18—Further explanation; Conclusion of Class 153; Class 305, Land Vehicles, Wheel Substitutes; Start on Class 51, Abrading.

Firms licensed to use patents seized from enemy nations may make continuing use of the patents, on a non-exclusive basis. When the patents expire, the licensed firms will confront the same conditions that apply to any patent of the licensee.

Note—In the lists below, the sub-class number appears first in parentheses, followed by the patent number, description of patent, inventor's name, his nation, and the date patent was issued.

Class 51—Abrading—Continued

(278) 2,093,852. Sheet abrasive material and method of manufacturing same. F. Simon, Germany. 9-21-37.

(287) 1,964,233. Method of grinding straight and helical teeth on spur wheels. P. Uhlich, Germany. 6-26-34.

(287) 1,980,554. Method of and device for producing conjugate worm gearings. H. Schicht, Germany. 11-13-34.

(289) 2,156,485. Method of grinding cylindrical work pieces between two grinding disks. C. Thyssen, Germany. 5-2-39.

(CONTINUED ON PAGE 103)

Strip Act— *very unpopular with the Axis!*

Spotlighted in the war production program is Superior's unique process for producing SuVeneer Clad Metal . . . bi-metallic, copper and steel *strip* . . . saving many thousand *tons* of vital copper each month in military service . . . a measurable factor in hastening Victory . . . immeasurable in *your* post war product fabrication!

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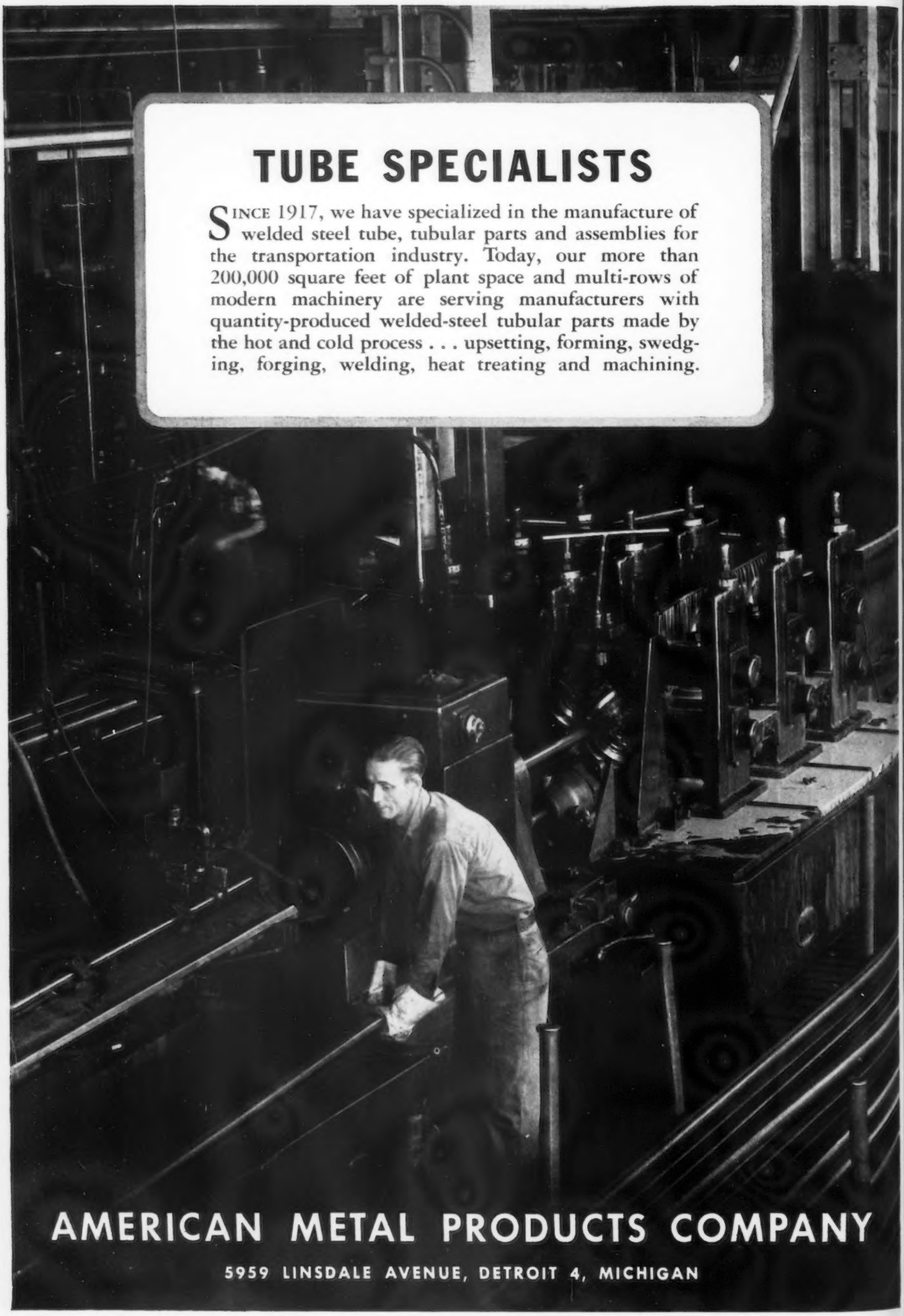

TUBE SPECIALISTS
SINCE 1917, we have specialized in the manufacture of welded steel tube, tubular parts and assemblies for the transportation industry. Today, our more than 200,000 square feet of plant space and multi-rows of modern machinery are serving manufacturers with quantity-produced welded-steel tubular parts made by the hot and cold process . . . upsetting, forming, swedging, forging, welding, heat treating and machining.
AMERICAN METAL PRODUCTS COMPANY
5959 LINSDALE AVENUE, DETROIT 4, MICHIGAN

Fourth Installment of Seized Patents

(CONTINUED FROM PAGE 100)

(293) 2,320,569. Treatment of worn abrasive belts. Particularly applies to a method of renewing the usefulness of emery cloth, glass paper and sand paper belts for wood and metals. H. Conrady, Germany. 6-1-43.

(295) 1,935,798. Method of producing cutting and grinding tools for operating on hard enamel and porcelain. P. Hepf, Germany. 11-21-33.

(295) 2,000,532. Processes for producing waterproof abrasive paper with the use of cellulose esters as the binding media. Carl Munch, Germany. 5-7-35.

(296) 1,944,807. Process for producing grinding bodies. T. Pohl, Germany. 1-23-34.

(296) 1,984,835. Method of making tools, particularly with making grinding, polishing stones or the like and oil stones consisting of aluminum oxide. H. Kohl, Germany. 12-18-34.

(298) 1,986,849. Abrading material and process for preparing the same. T. Pohl, Germany. 1-8-35.

• • • The chemical patents and patent applications vested by the Alien Property Custodian have been abstracted by the Chicago Section, American Chemical Society and are now being indexed. Beginning in January, these abstracts will be published in 31 classified, indexed pamphlets, to be followed by a master index and a supplement of new abstracts. The prices, if demand is adequate to justify them, will be $1 for any booklet and $25 for all 33 booklets. Orders should be placed not later than Dec. 10. Order blanks may be had from the Alien Property Custodian, Field Bldg., Chicago 3, Ill.

(298) 2,113,142. Method for the production of grinding rings and grinding cylinders from emery and a binding medium of raw rubber. H. Randall, Germany. 5-5-38.

(301) 1,693,697. Composition of matter for use in honing razors and other knives. W. Hafner, Germany. 12-4-28.

(309) 1,984,841. Agent for polishing, sharpening, and grinding articles of great hardness, particularly hard alloys. R. Reichmann, Germany. 12-18-34.

(309) 2,204,826. Grinding tool consisting of an aluminum carrier with grains of grinding material pressed into it. H. Schneider, Germany. 6-18-40.

(309) 2,270,607. Ceramic cutting tool especially suited for special purposes, as for instance, the treatment of artificial resins. E. Ryschkewitch, Germany. 1-20-42.

(309) 2,285,205. Hard metal body comprising a ring-shaped diamond impregnated tool bit sintered to a separately formed sintered supporting shank. J. Hinnuber, Germany. 6-2-42.

(2) 2,172,032. Gear wheel grinding apparatus. M. Philippe, France. 9-5-39.

(9) 2,188,716. Apparatus for projecting granular material. J. Jacobovics, Luxemburg. 1-30-40.

(26) 1,816,363. Means for scouring and polishing asphaltic plates. F. de Both, Netherlands. 7-28-31.

(28) 1,951,080. Mechanical cock-grinding machine by which cocks of all kinds may be readily ground to make them tight. J. Bartos, Czechoslovakia. 3-13-34.

(34) 2,313,287. Drive for the spindles of machine tools. A. Bailly, France. 3-9-43.

(36) 1,943,529. Apparatus for grinding cutter bars of mowing machines. A. Hirth, France. 1-16-34.

(50) 1,765,203. Machine tool especially applicable to grinding machines consisting of a bed, a work supporting table, centering means on said table, an arched member extending above the bed to one side of said centering means, guideways on the underside of the arched member and a grinding wheel. A. Bussy, France. 6-17-30.

(51) 1,836,853. Machine for forming ovals. E. Laffineur, Belgium. 12-15-31.

(54) 1,864,894. Apparatus and method for grinding, smoothing and polishing glass. P. Dryon, Belgium. 6-28-32.

(56) 1,665,776. Apparatus for smoothing and polishing glass. P. Escole, France. 4-10-28.

(56) 1,716,819. Apparatus for the continuous polishing of glass strip, plates or sheets. C. Heuze, Belgium. 6-11-29.

(56) 2,019,398. Process and apparatus for chamfering the sharp edges of small plates of a lining. G. Desagnat, France. 10-29-35.

(58) 2,185,922. Sharpening device for razor blades. B. Meitner, Hungary. 1-2-40.

(63) 1,823,926. Sharpener for razor blades. E. Avignon, France. 9-22-31.

(72) 1,870,818. Grinding machine used in the manufacture of knives such as safety razor blades. M. Maag, Switzerland, and R. Salomon, France. 8-9-32.

(74) 2,023,275. Method and means for polishing mirrors, etc. B. Long, France. 12-3-35.

(80) 1,941,501. Grinding and polishing machine for cutting tools especially safety razors, wherein the cutting edge of the blade or other tool are simultaneously operated on between a pair of cylinders rotating in opposite directions and having annularly or helically grooved surfaces. L. Steiner, Hungary. 1-2-34.

(80) 2,035,249. Means for guiding the work piece in that type of sharpening machines in which both sides of a cutting edge of the work piece are simultaneously operated on between a pair of rotating sharpening cylinders. L. Steiner, Hungary. 3-24-36.

(80) 2,164,959. Machine for sharpening metal strips to obtain a fine cutting edge. L. Steiner, Hungary. 7-4-39.

(86) 1,701,108. Machine for grinding razor blades of the kind in which the blades are ground by two rollers. A. Harms and O. Jennow, Denmark. 2-5-29.

(92) 1,674,888. Machine for simultaneously grinding or polishing a number of grooves located adjacent each other in plates of glass, marble and like material. J. Cleton, Jr., Netherlands. 6-26-28.

(105) 1,978,315. Machine for grinding valves set at any angle also means for trimming with a diamond the valve-grinding wheels, for sharpening the cutters used for machining the valve seats and for grinding the inner and outer surfaces of small parts. G. Lemay, France. 10-23-34.

(109) 1,849,925. Surfacing device for glass and ceramic articles. C. Heuze, Belgium. 3-15-32.

(109) 1,932,305. Surfacing apparatus for smoothing, grinding and polishing glass. P. Escole, France. 10-24-33.

(110) 1,824,347. Apparatus for the continuous grinding, smoothing and polishing of glass plates. C. Hibon, France. 9-22-31.

(110) 1,830,895. Table feed mechanism for grinding, smoothing and polishing apparatus in which the materials to be treated are supported by rows of tables having a continuous movement beneath members which always perform the same work. S. Werotte, Belgium. 11-10-31.

(110) 1,864,823. Apparatus for grinding.

smoothing and polishing plate glass, sheet glass. C. Heuze, Belgium. 6-28-32.

(110) 1,864,822. Apparatus for grinding, smoothing and polishing plate glass, etc. C. Heuze, Belgium. 6-28-32.

(110) 1,871,992. Apparatus for grinding, smoothing and polishing plate and sheet glass, marble, etc. C. Heuze, Belgium. 8-16-32.

(110) 2,313,493. Process of and means for grinding glass plates. P. Mols, Belgium. 3-9-43.

(119) 1,738,730. Apparatus for grinding, smoothing, and polishing plates of glass, marble, etc. E. Rowart, Belgium. 12-10-29.

(120) 2,023,572. Method for effecting by pressure the face grinding of hard material surfaces, such as marble, glass, steel, etc. G. Brendel, France. 12-10-35.

(129) 1,915,853. Grinding machine for crank shafts preferably such crank shafts that have two, four, six or more double shafts and which are employed in rapidly rotating engines as, for instance, automobile engines. H. Eriksen, Denmark. 6-27-33.

(134) 1,932,893. Machine for grinding the ends of spiral springs and other similar work. R. Herckelbout, France. 10-31-33.

(153) 1,862,457. Device for sharpening the blades of safety razors. W. Barsch, France. 6-7-32.

(153) 1,863,431. Device for sharpening safety razor blades. W. Barsch, France. 6-14-32.

(153) 1,947,849. Device for honing and stropping razor blades. A. Hazan, Belgium. 2-20-34.

(158) 2,097,058. Apparatus for whetting little shaving knives. S. Bylicki, Poland. 10-26-37.

(161) 1,994,799. Apparatus for resharpening safety razor blades. D. Vis, Jr., Netherlands. 3-19-35.

(165) 1,927,750. Measuring instrument controls for machines. M. Mennesson, France. 9-19-33.

(192) 2,131,499. Pneumatic polishing wheel of the kind to be used for all polishing work on flat, or even concave surfaces. C. Mary, France. 9-27-38.

(195) 1,928,196. Methods and apparatus for surfacing and polishing plate glass. F. Bertrancourt, Italy. 9-26-33.

(195) 2,164,418. Means for treating surfaces of hard bodies such as marble. G. Monnet, Belgium. 7-4-39.

(197) 1,739,294. Polishing disk for glass plates. G. Despret, France. 12-10-29.

(206) 1,717,304. Drilling device for the manufacture of glass-bottle necks. J. Bayet, France. 6-11-29.

(209) 1,938,520. Grinding wheel in which the entire grinding surface is used and it is thus possible to completely grind the surface of wood or other substances. K. Drapnal, Czechoslovakia. 12-5-33.

(209) 2,105,634. Machine for facing the surface of hard substances by pressure. G. Brendel, France. 1-18-38.

(218) 2,019,742. Workholder for sharpening machine in which the work is rotatably mounted on a pivot so that a double-edge blade may present in succession both edges for sharpening without being removed from its position on the pivot. L. Steiner, Hungary. 11-5-35.

(219) 2,133,414. Drill grinding machine for grinding the helicoidal relieving surfaces of a two groove drill with two helicoidal relieving surfaces. A. Bahuaud, France. 10-18-38.

(219) 2,199,773. Machine for sharpening the points of twist drills or the like. J. Armand, France. 5-7-40.

(229) 2,276,789. Apparatus for grinding diamonds and the like. Arpad Nagy, Czechoslovakia. 3-17-42.

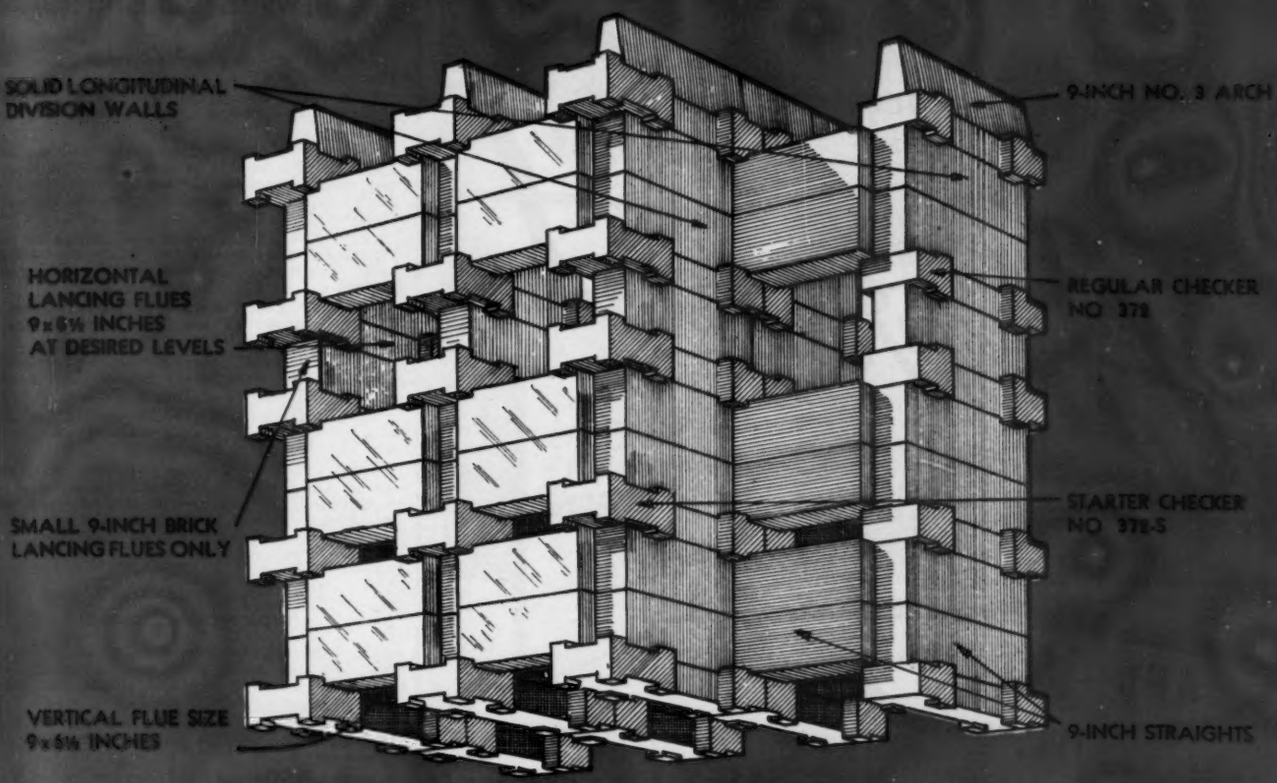
(237) 1,656,814. Template for grinding machines for machining cam shafts such as those of the explosion engines of the Hispano-Suiza type. M. Birkigt, France. 1-17-28.

(238) 1,660,291. Grinding machine for machining of cam shafts for explosion engines. M. Birkigt, France. 2-21-28.

(238) 2,000,240. Method and means for grinding mirrors, sheet glass. B. Loua, France. 5-7-35.

(240) 1,947,930. Surfacing apparatus for

FASTER HEATS · BETTER EFFICIENCY · LOWER FUEL COSTS · MINIMUM REPLACEMENTS



SMALLEY *Checkers*

FOR OPEN-HEARTH REGENERATORS

HIGHLIGHTS

- Unusually stable interlocked construction.
- Standard sizes for 80% of the structure.
- Special shapes (relatively few) lock the structure firmly together.
- Installed as readily as systems built with rectangular brick.
- Installation cost, low.
- Cleaned without interruption to furnace operation.
- Uniform distribution of gases through regenerators.
- Vertical flues not staggered, hence unrestricted.
- Large area of effective surface for heat recovery.
- Ample space for the accumulation and removal of dust.
- Salvage, exceptionally high.
- Maintenance cost, low.
- Adaptable to various sizes of flue openings.
- Furnished in various types and classes of refractories.

COMPARATIVE DATA

		Smalley Checkers	9-inch Straight Checkers
		Per Cubic Foot of Checker Work	
Volume of Brick	9-inch Equivalent	7.38	5.05
Total Heating Surface	Square Feet	3.78	3.74
Effective Heating Surface	Square Feet	3.33	1.93
		Vertical Flue Size	Horizontal Free Area
Smalley Checkers		9" x 6½"	53%
9-inch Straight Checkers		6½" x 6½"	52%

TRADE-MARK

REG. U. S. PAT. OFF.

HARBISON-WALKER REFRACTORIES COMPANY

AND SUBSIDIARIES

WORLD'S LARGEST PRODUCER OF REFRACTORIES

GENERAL OFFICES, PITTSBURGH 27, PENNSYLVANIA

smoothing, grinding and polishing glass. P. Escole. 2-20-34.

(241) 2,191,617. Grinding machine for rectifying valve seats. P. Koster, France. 2-27-40.

(263) 2,069,261. Feeding device and method for supplying liquids or mixtures of a liquid and solid substances carried by said liquid to one or more machines or the like. G. Monnet, Belgium. 2-2-37.

(264) 1,843,198. Process and apparatus for regulating the density of fluids containing solid particles. L. Berquerand, Germany. 2-2-32.

(273) 1,912,660. Apparatus for catching a moving volume of air. P. Segui, France. 6-6-33.

(285) 1,870,817. Manufacture and method of grinding knives, razor blades. M. Maag, Switzerland, and R. Salomon, France. 8-9-32.

(286) 1,713,743. Method for truing up the measuring jaws of sliding calipers. E. Challet, Switzerland. 5-21-29.

(309) 1,704,308. Process of producing a polishing and grinding material consisting substantially of a mixture in powder form of titanium oxide and another titanium salt, both salts being in an unroasted condition. B. Szilard, France. 3-5-29.

Class 76—Metal Tools and Implements, Making

(9) 1,969,317. Stretching machine for forging unwieldy tools such as the prongs of forks for handling hay and stones. H. Muller, Germany. 8-7-34.

(12) 1,896,199. Apparatus for the production of files and file casings. A. Peiseler, Germany. 2-7-33.

(24) 1,776,711. Method for producing the teeth on files, saws and similar tools. P. Unger, Germany. 9-23-30.

(24) 1,965,037. Treatment of steel tools for improving and sharpening tools having cutting edges such as files, rasps, milling cutters, saws, knives and the like. M. Hardtmann, and A. Werner, Germany. 7-3-34.

(24) 2,068,622. Method of making double cut files. H. Ufer, Germany. 1-19-37.

(24) 2,173,218. Method for whetting files, rasps, and the like by etching by means of acid. E. Zoppi, Italy. 9-19-39.

(25) 1,968,352. Process and apparatus for the setting and sharpening and/or the cutting of saws of all kinds. E. Poeggel, Germany. 7-31-34.

(25) 2,030,225. Means for cutting, setting, and sharpening circular saws. E. Poeggel, Germany. 2-11-36.

(36) 1,906,881. Saw sharpening tool by which all teeth of a saw can be filed to a uniform depth and the faces of teeth can be uniformly sharpened in such a manner that the pitch and root of tooth remain alike during repeated sharpening. L. Olas, Austria. 5-2-33.

(43) 1,748,686. Machine for sharpening circular saw blades. J. Strehle, Germany. 2-25-30.

(44) 2,068,793. Process for the rapid recarburization of pig iron melted in a cupola furnace. H. Frauenknecht, Italy. 1-26-37.

(54) 1,716,241. Machine for swaging and shaping saw teeth wherein the swaging and shaping are both performed during the same stage of the passage of the saw through the machine, while the saw is stationary between two feed movements. H. Raimann, Germany. 6-4-29.

(66) 2,154,987. Saw-set device for setting the saw-teeth into their operative position. E. Martin, Germany.

(101) 1,887,079. Method of manufacturing staple-driving punches. G. Winter, Austria. 11-8-32.

(101) 1,955,044. Process of manufacturing tools by which the field of use of those metal alloys which are built up on the basis of carbides of metals of high melting point (tungsten group) is considerably enlarged. H. Ammann, Germany. 4-17-34.

(101) 2,019,934. Method of manufacturing hard metal tools composed of a carrier made from steel or iron and a body of hard metal alloy forming the tool proper. K. Schroter and H. Wolff, Germany. 11-5-35.

(101) 2,243,608. Process of making plug screw thread gages either working or reference gages. W. Schaurte, Germany. 5-27-41.

(104) 1,635,614. Method of manufacturing the knives of razors. E. Gerling, Germany. 7-12-27.

(104) 1,748,522. Pile wire and method of

What part will machine tools play in helping

to feed this hungry belly?

Here stands a souvenir of War—a silent, implacable challenge to the meaning of our words . . . Here stands *want.*

A grim reminder that we must not waste food now—that we dare not complain—it also says, as no words could, that part of the victory we're fighting for can only be won with plowshares.

What part will machine tools play? The greatest part in history. For there is scarcely an essential to civilized living today that does not stem from a handful of basic precision machine tools . . . from the barest necessity, a loaf of bread, to the most intricate and wonderful machines which help men think, to search and to know.

And one of these machine tools—the internal grinding machine—is essential to the creation of literally *everything* that will make this world a better place in which to live, after this war is won.

BRYANT

BRYANT CHUCKING GRINDER COMPANY SPRINGFIELD VERMONT, U.S.A.

making the same. C. Schlemper, Germany. 2-25-30.

(104) 1,942,324. Scissors and method of manufacturing the same wherein the cutting legs are stamped out of hardened sheet-steel. J. Brangs, Jr., Germany. 1-2-34.

(104) 1,947,964. Manufacture of scissors having separately made hollow cutting blades and handle members, which consists in stamping the handle members, stamping out the cutting blades from a bright piece of tapered steel, hollow-pressing the cutting blades, and then polishing them without grinding them. H. Beckmann, Germany. 2-20-34.

(105) 1,638,902. Method of making household articles such as spoons and forks, consisting in hot-forging from a bar the bowl or prong portion in one operation, and forging the remainder and finish-forging the portion already forged in the next operation. R. Wittlinger, Germany. 8-16-27.

(105) 1,864,003. Method of manufacturing spoons and similar articles from a copper-zinc alloy. K. Springorum, Germany. 6-21-32.

(105) 2,186,602. Process for the production of rolled and stamped table and kitchen articles. P. Bosbach and E. Keller, Germany. 1-9-40.

(105) 2,097,971. Process of producing an embossing roller for manufacturing lenticular film. J. Eggert and G. Heymer, Germany. 11-2-37.

(111) 1,733,260. Method of manufacturing forks with two and more prongs such as hay-forks. O. Hermann, Germany. 10-29-29.

(112) 1,732,692. Method for the production of saw blades by the use of a milling cutter in a single continuous working operation. A. Peiseler, Germany. 10-22-29.

(112) 1,842,789. Method of making circular saws with inserted teeth. H. Langenbach, Germany. 1-26-32.

(24) 1,645,895. Process for the manufacture of files of the type composed of a plurality of file blades arranged side by side and fastened together. E. Coenen, Belgium. 10-18-27.

(40) 1,874,315. Machine for sharpening of saws by an artificial grindstone. L. Laurent, France. 8-30-32.

(101) 1,796,925. Method of manufacturing a single-piece screw cutting die from a die blank having a center opening. J. Folman, Poland. 3-17-31.

(107) 1,751,382. Process of mounting the dies used as in production of metal threads or wires. C. Archer, France. 3-18-30.

(114) 1,916,605. Method of making adjustable spanners in which one of the jaws comprises two parallel side plates. J. Chobert, France. 7-4-33.

Class 218—Button, Eyelet and Rivet Setting

(2) 1,771,882. Riveting machine adapted particularly for riveting or stitching fiber, board, leather or the like. H. Elsner, Germany. 7-29-30.

(2) 1,859,081. Riveting machine adapted to handle solid, hollow and two-pointed rivets. H. Elsner, Germany. 5-17-32.

(19) 1,840,103. Riveting tool whereby two parts such as two pieces of sheet metal can be rigidly connected by rivets. H. Junkers, Germany. 1-5-32.

(29) 1,809,154. Riveting of joints by means of hollow or tubular rivets. E. Becker, Germany. 6-9-31.

(29) 2,086,218. Manufacture of rivet connections and more particularly to connections established by means of hollow or tubular rivets. W. Eckold, Germany. 7-6-37.

(15) 1,945,892. Rivet setting machine adapted to press two pieces against each other through a hole previously made by the machine in the work. J. Gobin, France. 2-6-34.

(15) 1,969,214. Rivet setting machine adapted to set in a work a rivet made of two elements whose tubular portions are adapted both to enter the hole in the work. J. Gobin, France. 8-7-34.

(19) 2,004,624. Device for setting tubular rivets. J. Antelme, France. 6-11-35.

(19) 2,049,822. Apparatus for beading eyelets in which an eyelet is inserted in a hole in the pieces to be fastened together and then beaded. D. Polly, France. 8-4-36.

(To Be Continued in An Early Issue)

FOOTWORK— ON THE OCEAN

Another Success Story for BARIUM STEEL

"FULL SPEED AHEAD . . . FULL SPEED ASTERN" . . . Now to port, now to starboard — a PC Boat must be able to *maneuver* faster than the submarine it's chasing.

This rapid "footwork" puts a test on the propeller shafts — a test in strength and toughness that is met by BARIUM STEELS

Melted and refined in Barium's Furnaces.

Forged under Barium's Hammers and Giant Presses.

Scientifically Heat Treated.

Turned on Barium's Lathes.

Propeller shafts in PC Boats are proving the value of *unified control* — from the first melt to the final turn — a reason for the growing success of Barium Steels in propeller shafts and thrust bearings for naval vessels . . . breech blocks and housings for naval ordnance.

We invite your inquiries for Die Blocks, Hammer Rods and Heavy Forgings.

BARIUM STAINLESS STEEL CORP.

Producers of Stainless, Alloy, and Carbon Steels **CANTON, OHIO**

WPB Names New Advisory Committees

• • • **WPB has announced formation** of the following industry advisory committees:

Dial Pressure Gage Industry

Government presiding officer: E. A. Capelle; committee members: Frank Breor, The Crosby Steam Gauge & Valve Co., Boston; H. G. Musgrave, Starr Brass Co., Boston; J. P. Cavanaugh, J. E. Lonergan Co., Philadelphia; Aaron S. Newmark, Champion Gauge Co., Corona, Long Island, N. Y.; J. M. Considine, Marshalltown Mfg. Co., Marshalltown, Iowa; H. B. Nickerson, Ashton Valve Co., Cambridge, Mass.; M. R. Emhoff, Scientific Instrument Co., Detroit; A. Popkin, Acme Gauge & Instrument Co., Brooklyn; C. L. Hastings, Rochester Mfg. Co., Rochester, N. Y.; L. Ridington, Hartley Gauge Co., Lansdale, Pa.; O. W. Heise, Bourdon Tube Co., Newton, Conn.; A. N. Rose, J. P. Marsh Co., Chicago; D. M. Hill, Foxboro Co., Foxboro, Mass.; R. V. Rourke, Waterhouse Co., Webster, Mass.; Miss M. E. Ruf, pres., Cleveland Steam Gauge Co., Cleveland; C. N. Sugden, Manning, Maxwell & Moore Co., Bridgeport, Conn.; R. Weingart, Certified Gauge & Instrument Co., Long Island City, N. Y.; W. Ziegler, U. S. Gauge Co., New York; John Padesky, Electric Auto Light Co., LaCrosse, Wis.

Western Zinc Mining Industry

Government presiding officer: James Douglas; committee members: R. B. Caples, Anaconda Copper Mining Co., Great Falls, Mont.; E. H. Snyder, Combined Metals Reduction Co., Pioche, Nev.; Cecil Fitch, Chief Consolidated Mining Co., Eureka, Utah; Joseph H. Taylor, Peru Mining Co., Silver City, N. M.; E. W. Jamison, Sierra Zinc Co., Colville, Wash.; C. T. Van Winkle, Rico Argentine Mining Co., Rico, Colo.; J. Jensen, Pend Oreille Mines & Metals Co., Spokane, Wash.; H. G. Washburn, Federal Mining & Smelting Co., Wallace, Idaho; W. C. Page, United States & Lark, Salt Lake City, Utah; J. A. Wilcox, Shattuck-Denn Mining Corp., Bisbee, Ariz.

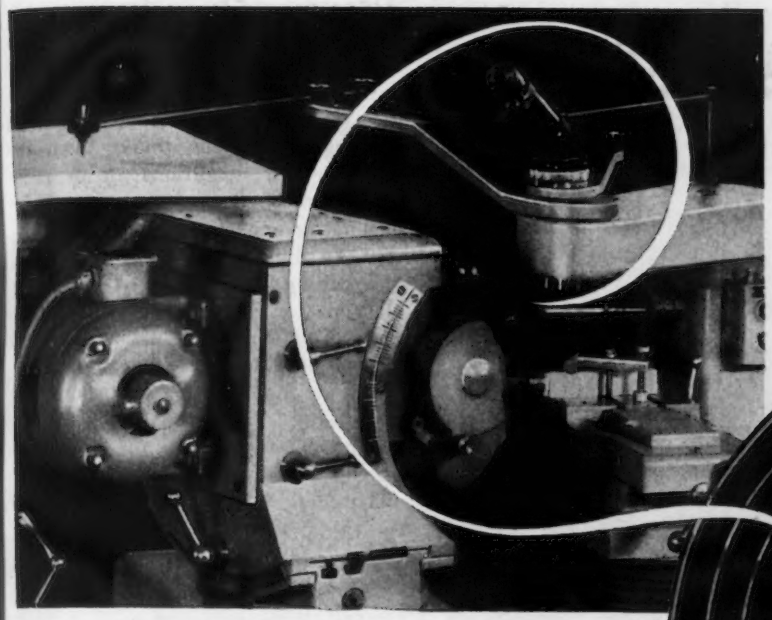
Industrial Liquid-Cooled Engine Industry

Government presiding officer: R. L. Vaniman; committee members: Charles Balough, Hercules Motors Corp., Canton, Ohio; R. E. Huthsteiner, Cummins Engine Co., Columbus, Ind.; R. G. Burke, Chrysler Corp., Detroit; J. A. Mahoney, Climax Engineering Co., Clinton, Iowa; J. E. DeLong, Waukesha Motor Co., Waukesha, Wis.; Ralph K. Mangan, Buda Co., Harvey, Ill.; R. B. Harvey, Novo Engine Co., Lansing, Mich.; Bert Oakley, Hall-Scott Motor Car Co., Berkeley, Cal.; Carl Hofmeister, Hill Diesel Engine Co., Lansing, Mich.; C. W. Pendock, Le Roi Co., Milwaukee; A. C. Howard, Fairbanks, Morse & Co., Chicago; E. R. Redford, Sterling Engine Co., Buffalo; C. J. Reese, Continental Motors Corp., Muskegon, Mich.; A. C. Thompson, Caterpillar Tractor Co., Peoria, Ill.; Paul Schnotsky, Murphy Diesel Co., Milwaukee.

26 Agencies Blend in War Fund

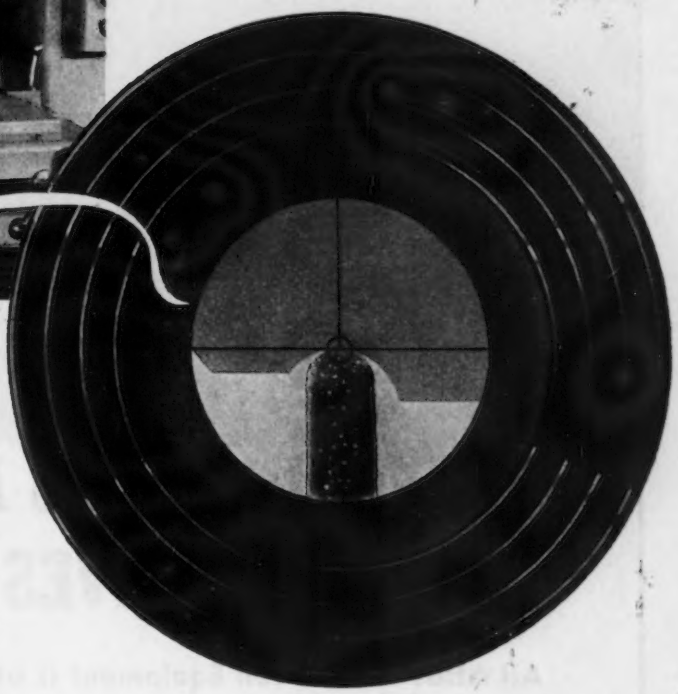
• • • **Americans may now** contribute at one time to a merger of 26 war-related organizations serving our own armed forces and civilian relief needs of our fighting allies through the National War Fund now being conducted.

The National War Fund was created in response to a public demand for unification of fund-raising activities of more than 500 organizations. As a result more than a hundred agencies have been merged into 26.



Here's

WHAT YOU SEE THRU THE 'SCOPE



During Accurate Grinding Of Any Desired Profile

Profiles being ground on the Wickman Profile Grinder are constantly inspected as the work progresses. When the work is completed no further inspection or checking of the part is necessary.

The cross hairs in the optical center of the 30 power microscope are focused on the work and grinding wheel. The intersection of these cross hairs corresponds to the position of the pantograph pointer on a 50 times size layout of the profile to be ground.

The grinding wheel is manually fed to the intersection of the cross hairs after each movement of the pantograph arm and its exact position is observed through the microscope. The work is always viewed in the operating plane, even though a clearance angle is being ground.

Innumerable forms can be ground on this machine in any material including tungsten-carbide. Accuracy can be held to .0005" and on occasions even closer. WRITE FOR FULL DETAILS.

BUY WAR BONDS

WICKMAN PROFILE GRINDER

THE Wickman CORPORATION

15537 WOODROW WILSON AVE.
DETROIT, MICHIGAN

AISI Manual Describes Overseas Packaging Methods

• • • **Standard packages** for delivering steel mill products overseas in first-class condition under even the most severe conditions of wartime transportation have been designed by packaging experts of the steel industry. An illustrated, 180-page manual, "Packaging, Marking & Loading Methods for Steel Products for Overseas Shipment," has just been issued by the Committee on Packaging, Loading and Shipping Problems of the American Iron and Steel Institute, which has been approved by the Army Service Forces, the Navy Department and the U. S. Treasury, Procurement Division.

The standard packages described in the manual have been designed to protect steel products during shipment to any port of the world, so that neither the extreme heat of the tropics nor northern sleet storms can damage them.

Steel itself, paper and wood are the most commonly used packaging materials, according to the manual. In packaging many of the more highly finished products such as wire, cold finished bars, cold rolled sheets and cold rolled strip, these products are protected against rusting caused by atmospheric conditions by coatings of special rust-inhibiting oils and greases.

Maritime Commission Halts Anti-Torpedo Netting Orders

Buffalo

• • • **All production** of anti-torpedo wire netting at the Wickwire Spencer Steel Co.'s Buffalo plant has been stopped by order of the Maritime Commission. Orders for the netting were placed secretly last June.

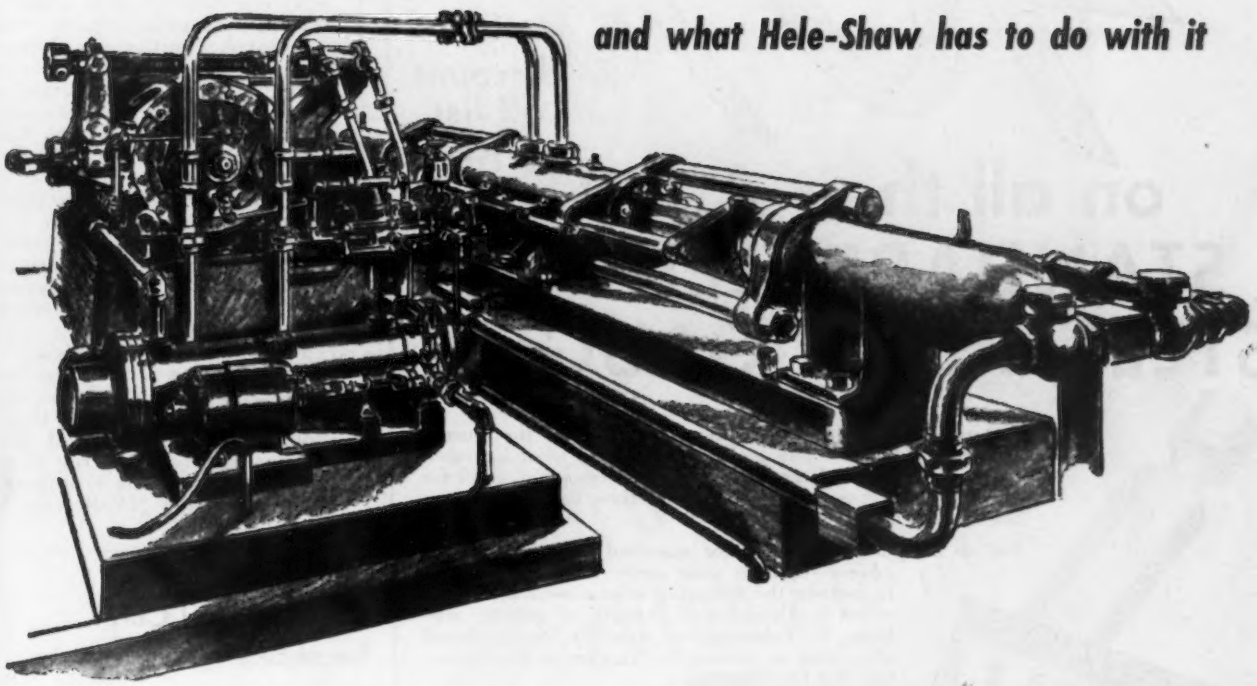
The netting is tossed over the side of boats to deflect torpedoes and has been used chiefly by merchant vessels. It has a short life in salt water, and a tremendous amount of netting was required when the submarine menace was at its height.

William A. Steele, manager of the Wickwire plant, said "It appears our boats now are getting torpedo alarms while at sea. As a result, netting is not tossed overboard as much as it used to be."

No appreciable effect on employment or the overall production of the Buffalo plant will result from the discontinuance of netting manufacture, he said. Employees involved will be transferred to other departments.

WHEN IS A PIPE SAFE? —

and what Hele-Shaw has to do with it



Pipes, tubes, and other high-pressure containers used to be tested by complicated arrangements of accumulators, intensifiers and valves. Often, leakage made it impossible to develop proper testing pressures. Sometimes these "one shot" devices failed to hold pressure on the first stroke and a second stroke was necessary.

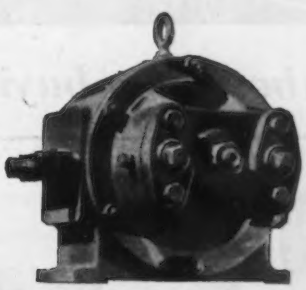
One inventive mind saw a better solution, using Hele-Shaw Fluid Power (oil under pressure). Working with our engineers, he devised a tester for producing high hydrostatic pressures which applied and sustained pressures automatically and free of fluctuations. This improved pipe testing machine could be adjusted quickly over a wide range of pressures, and could be remotely controlled. There were many more advantages.

We're ready to put Hele-Shaw Fluid Power to work for you. Any post-war application concerning the improvement of a product or process, or simplification of control or operation of a machine may be appropriate for the use of Hele-Shaw Fluid Power. Hele-Shaw engineers are ready to help you find out.

THE

Hele-Shaw

Fluid Power Pump



OTHER A-E-CO PRODUCTS: TAYLOR STOKERS, MARINE DECK AUXILIARIES, LO-HED HOISTS

AMERICAN ENGINEERING COMPANY

2410 ARAMINGO AVENUE • PHILADELPHIA 25, PA.

Controlled Hiring Sweeps Ohio Areas

Cleveland

• • • Government controlled hiring of all men and women for war, essential civilian industry and non-essential industry has been invoked in theLima-Sidney, Ohio district. Similar to other hiring plans, but more rigid in some respects, all labor channels through the United States Employment Service. No gate hiring is permitted.

Other labor areas in the Ohio-Kentucky-Michigan region also went into control of male hiring on the 149 critical occupations. Akron, the Dayton-Springfield area and the Canton-Massillon, Ohio, districts expect to also come under controlled hiring.

Gate hiring will likely be discontinued soon in Elyria, Lorain, Warren, Youngstown and Hamilton, Ohio, areas. Detroit also anticipates referral hiring at an early date after such a proposal by the regional WMC director.

National Steel Corp. Reconciled With Institute

Pittsburgh

• • • After an extended cooling off period for various members of the American Iron & Steel Institute, and the National Steel Corp. and its subsidiaries, Weirton and Great Lakes, the latter are back in the fold after having been officially non-members for more than two years.

The estrangement reached a climax more than two years ago, when E. T. Weir, board chairman, National Steel Corp., granted a 10c. an hour wage increase while negotiations for a figure a few cents less than this were being concluded between United States Steel Corp. and United Steel Workers of America.

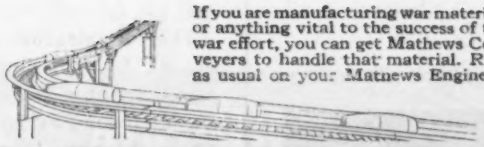
This particular incident, however, was not the whole reason for the withdrawal of the National Steel Corp. and its subsidiaries from the American Iron & Steel Institute. The composite reason for the withdrawal extended over a longer period of time and involved such things as post mortems, difference in viewpoints, personalities, etc.

Officers of the National Steel Corp. and its subsidiaries, at no time relinquished their personal memberships in the institute.

BACK UP FIGHTING COURAGE with the deadliest guns, bombs, tanks and planes, and you've got America's formula for victory.

There's no surer way to shorten the war . . . no surer way to save the lives of our fighting men . . . no surer way to save our American way of life.

Speeding up assembly . . . removing production bottlenecks . . . preventing hitches in the speeding movement of vital war materials is Mathews' contribution to America's war effort.



If you are manufacturing war material, or anything vital to the success of the war effort, you can get Mathews Conveyers to handle that material. Rely as usual on your Mathews Engineer.

MATHEWS CONVEYERS FOR MECHANIZED PRODUCTION

MATHEWS CONVEYER COMPANY ELLWOOD CITY PENNSYLVANIA

New Steel Furnaces, Foundry Capacity Open

Pittsburgh

• • • **The open hearth project,** involving eleven 225-ton open hearth furnaces at the DPC financed shop, Carnegie-Illinois Steel Corp. Homestead Works, was completed last week when the last of these units began production.

The first open hearth was cast June 14, 1943. Annual capacity of this shop approximates 1,500,000 tons.

This plant is one part of the WPB expansion program, which is temporarily supplying a substantial tonnage of steel ingots for which the WPB has had to look for a "home." This situation is expected to change when the slabbing mill for this DPC project is completed and in operation, later this year. The wide plate mill, which is also under construction here, is expected to go into operation during the first quarter of 1944.

•

• • • **United Engineering** & Foundry Co. announces the completion of a foundry expansion program that provides immediately available open capacity for the production of medium and heavy carbon and alloy steel castings in any quantity.

These new facilities provide a melting capacity consisting of nine furnaces ranging in size from 15 to 100 tons, capable of producing approximately 5000 tons of open hearth steel per month.

Foundrymen Receive Texas Chapter Petition

• • • **First steps in** formation of a Texas area chapter of the American Foundrymen's Association were taken Oct. 29 at a meeting held at the Rice Hotel, Houston. A petition for admission as the 25th chapter of the Association was approved by the 110 foundrymen present, and is being forwarded to the AFA board of directors. A second meeting for formal organization of the proposed chapter was announced for Nov. 26, also at Houston.

The organization work, initiated at the St. Louis Foundry Congress last April, is being carried on by a Texas committee headed by F. M. Wittlinger, Texas Electric Steel Castings Co., Houston. J. O. Klein, Texas Foundries Inc., Lufkin, Tex., serves as vice-chairman, and H. L. Wren, Barada & Page Inc., Houston, as secretary.

He Never Has to Take His Eyes Off the Cutter and Work

DEVLIEG JIGMIL

Spindle start, stop and reverse—

Power vertical feed and rapid traverse movement—

Power horizontal feed and rapid traverse movement—

Power automatic table retraction and repositioning—

Power feed and rapid traverse to bar movement—

are all carried in a master switch on the spindle head—at the operator's finger tips.

Thus, the operator of the DeVlieg Jigmil can fix his vision on the cutter and work—never has to look at controls during operation.

The Jigmil is what a machine tool should be—a powerful and accurate extension of the operator's hand. The value in precision boring and milling is apparent.

It's a NEW *Type Machine*

Spacing Accuracy of a Jig Borer . . . Performance Qualities of a Milling Machine . . . Convenience and Flexibility of a Horizontal Boring Mill.

New speed of operation . . . New standards of excellence of bored holes . . . New accuracy in milling . . . Automatic table retraction and repositioning dependable within .0002".

Many machines show 75% greater average daily productivity.

Write for Circular
DEVLIEG MACHINE TOOLS

DE VLIEG MACHINE COMPANY

450 FAIR AVENUE, FERNDALE (DETROIT), MICHIGAN

WPB Scheduled to Meet Magnesium Foundry Group

Cleveland

• • • **A national meeting** of magnesium sand cast foundry representatives will be held in Cleveland Nov. 29 and 30, under the auspices of the War Production Board. The meeting, to be held at Hotel Cleveland, has been planned to help producers increase output. The agenda for the two-day meeting is as follows:

Nov. 29—9:30 A.M.

"The Necessity for Speedy Increase in Production to Meet the Aircraft Program," by A. H. Bunker, director, the WPB Aluminum and Magnesium division.

"Better Manpower Utilization and Labor Relations," by Wendell Lund, special assistant to the chairman, WPB.

"The Need of Higher Physicals and Improved Quality in Magnesium Engine Castings," by E. Canning, Allison Division, General Motors Corp.

Nov. 29—1:30 P.M.

"Plan of Research to Assist Foundries in Magnesium Sand Casting Techniques and Practices," by Clyde Williams, director, Battelle Memorial Institute.

"Molding and Sand Preparation," by Leslie Brown, Bohn Aluminum & Brass Corp.

"Core and Sand Preparation," by Marvin Gantz, American Magnesium Corp.

Nov. 30—9:30 A.M.

"Melting and Pouring Practice," by Manley Brooks, Dow Chemical Co.

"Gating and Risering Methods," by A. Cristello, Eclipse Aviation Corp.

"Heat Treating Practice," by L. G. Lamker, Wright Aeronautical Corp.

Nov. 30—1:30 P.M.

"Inspection Problems," by Dr. Erwin Sohn, American Radiator and Standard Sanitary Corp.

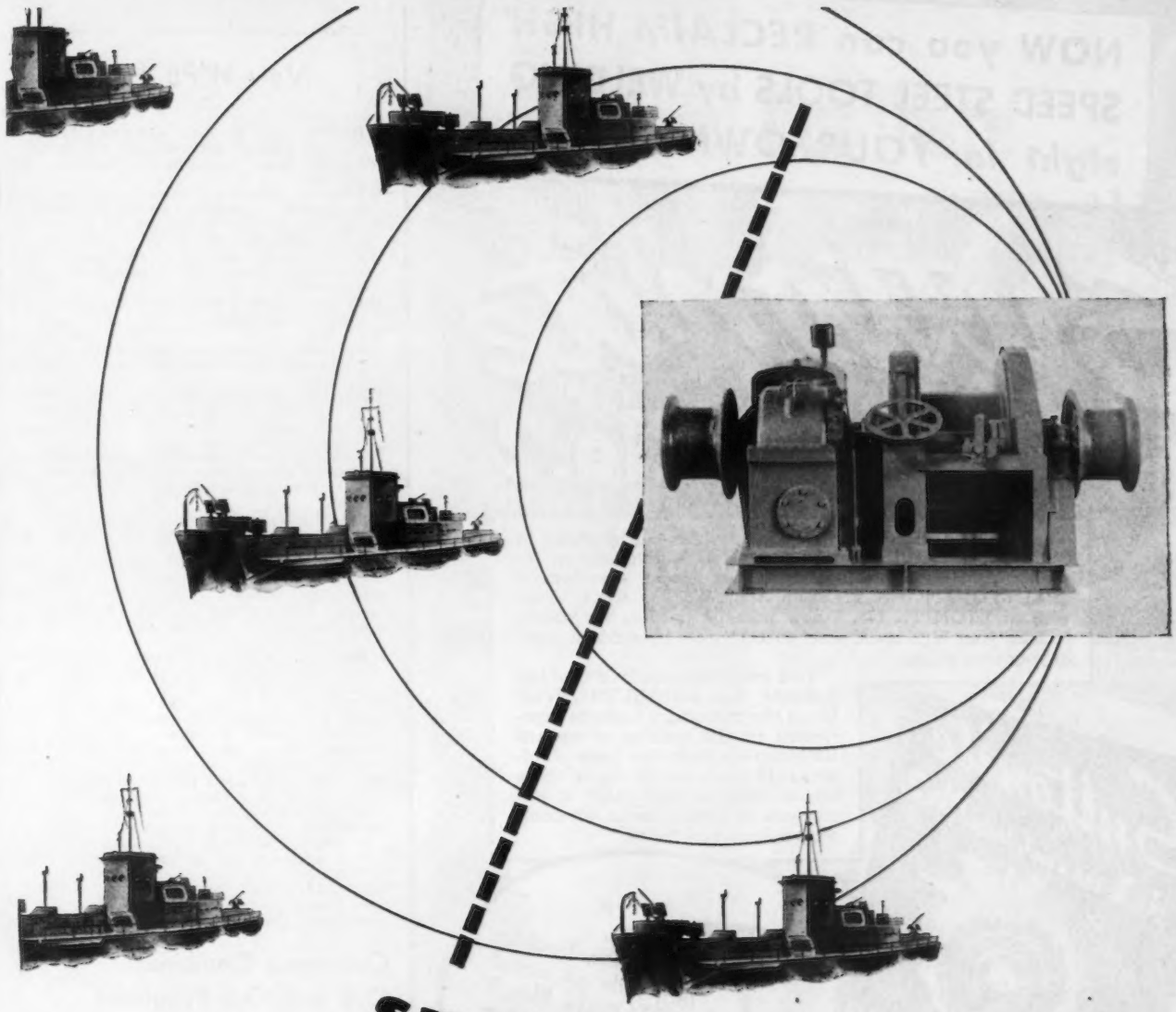
"A Trouble-Shooter's Report — The Small Errors that Cause Big Scrap," by Charles J. Scullin, Foundry Consultant.

"Functions of Magnesium Castings Section and Its Relation with Foundries and the Claimant Agencies," by G. A. Bilque, War Production Board.

Premium Charge Granted Iron Ore Fleet in December

Washington

• • • **Complying with a request** of WPB and ODT, the OPA has granted a post-season premium charge of 31.25 per cent of the established maximum rates for the transportation of iron ore on the Great Lakes during December. This temporary increase in charges is identical to the one established last year for December and had been granted, OPA said, to take care of increased costs to vessel operators resulting from December operating conditions and in order to insure during the coming season continued lake movements of iron ore vital to the war program.



special delivery

The task of landing infantry on hostile shores—and getting them off in a hurry when the need arises—falls to the LCI's. Gasoline driven windlasses, like that pictured above, are on the LCI's that are hitting the enemy where it hurts most. These windlasses constitute just one of the many contributions to our Navy's fighting strength that Bayard is proud to make!

BAYARD

M. L. BAYARD & CO., INC. • ENGINEERS AND MACHINISTS PHILA., PA.

The second star of continued achievement has now been added to the Bayard Navy "E" Pennant

New WPB Forms

WPB-2441—Arc welding electrode user's monthly report on orders and inventory.
WPB-865—Iron foundries: Capacities and facilities.
WPB-2446—Report of consumption and production of molybdenum wire, rod, and sheet and request for allocation of above for lamps, vacuum tubes or other uses.
WPB-95—Lead: Report of inventory, consumption, production and requirements. Monthly.
WPB-2444—Steel warehouse purchase and shipment authority.
WPB-2943—Cobalt: Inventories, consumption, and requirements as defined in General Preference Order M-39 as amended. Monthly.
WPB-2870—Tungsten wire and rod: Report of consumption and production and request for allocation of above for lamps, vacuum tubes, or other uses.
WPB-2578—Speed reduction units and unmounted gears: Manufacturers' monthly report of unfilled orders and schedule of shipments.
WPB-412—Tin: Report of inventory, consumption, production and requirements. Monthly.
WPB-939—Report of nickel contained in nickel scrap pursuant to Order M-6-c. Monthly.
WPB-1747—Aircraft components and materials for civilian aircraft requirements: Application for priority assistance for deliveries.
WPB-3330—Platinum: Processor's and consumer's monthly report of inventories, purchases and sales.
WPB-2920—Secondary lead and antimonial lead in pig form: Producers report on production, stocks, shipments (monthly).
WPB-949—High speed and tool steel: Producers' monthly report.
WPB-1837—Producer's monthly report on production of hard-facing materials pursuant to Limitation Order L-223.
WPB-1838—Producer's estimated requirements of alloying elements for hard-facing materials pursuant to Limitation Order L-229. (Monthly)
WPB-3320—Permission to sell ex-allotment, controlled materials reported to regional offices of the WPB.

Ordnance Combines O-5 and O-6 Programs

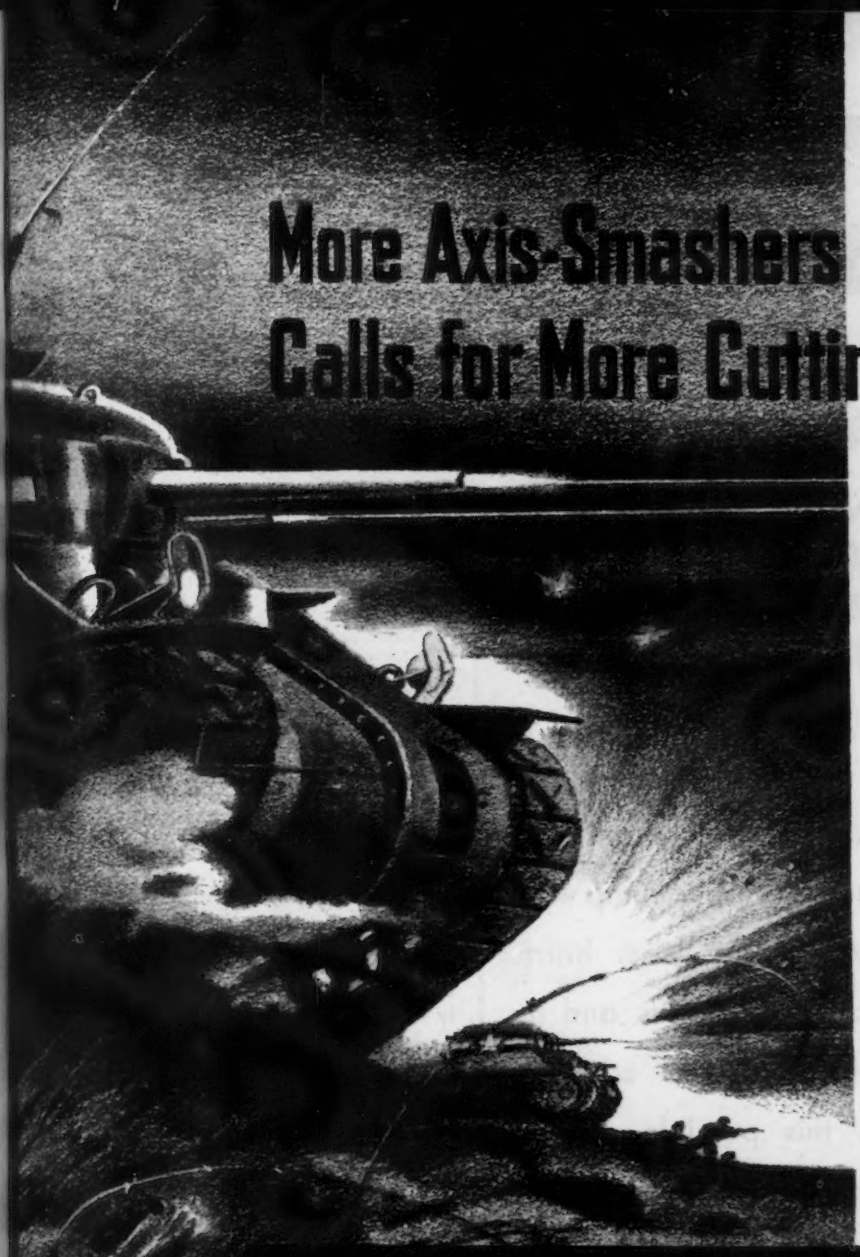
Washington

• • • **The Ordnance Department** of the War Department has combined the two programs formerly identified by the major program numbers O-5 and O-6. After this, allotments for both of these programs will be identified by the allotment number O-6.

Consumers may combine allotments identified by the allotment numbers O-5 and O-6 in a single allotment account. Orders charged against this account must be identified by the allotment number O-6. However, orders already placed bearing the allotment number O-5 need not be changed to O-6. This was issued as Directive 37 to CMP Regulation No. 1 on Nov. 15.

Error Made Reporting L-68

• • • **Last week this** magazine published under the heading "Priorities Changes" on page 118, a statement that a revision of L-68 removed all restrictions on the use of steel in closures. This is incorrect. Limitations on the use of steel were lifted or revised on a number of items including zippers, metal buttons, clothing fasteners.



More Axis-Smashers Out There... Calls for More Cutting Tools Back Here

America's Cutting Tool Industry Comes Through It's Most Severe Test

Behind every swift American victory on the battlefront is a story of swift American victory on the production front.

Take the case of one vital segment of our production front, the cutting tool industry. When war struck America, a tremendous expansion in the output of cutting tools had to be achieved . . . cutting tools to help build planes, tanks, ships, guns and ammunition.

And this job had to be done in the face of almost staggering difficulties: manpower shortages, material scarcities, engineering puzzles. To make a long story short, trained minds and trained hands got the job done—*and on time!*

Yes, and in addition to turning out new types of cutting tools, the cutting tool industry had to see that *existing* cutting tool equipment was used with optimum efficiency, and conserved through skillful care.

Recognizing this responsibility, Barber-Colman service experts were dispatched to war plants where their help was urgently needed. Service like this solved problems quickly, got wheels moving faster.

In short, the word "impossible" just isn't in the lexicon of Barber-Colman men. This is worth remembering when our war work is finished . . . when your peacetime production problems begin!

Barber-Colman Company

GENERAL OFFICES AND PLANT • 204 LOOMIS STREET • ROCKFORD, ILLINOIS, U. S. A.

Complete Cutting Tool Service • Engineering • Manufacturing

Hobs • Milling Cutters • Reamers • Special Tools • Sharpening Machines

Steel Industry Awaits Clarification of Coal Pact

Pittsburgh

• • • **Harold Ickes' blast** last week, criticizing the steel industry for not participating in the present coal negotiations at Washington, between John Lewis and some commercial coal operators, was considered here to be due to a lack of knowledge on the subject.

At a press conference Mr. Ickes said that the captive coal mine operators gave "most trouble," that they underproduced for their own needs and "with tears in their eyes" requested metallurgical coal.

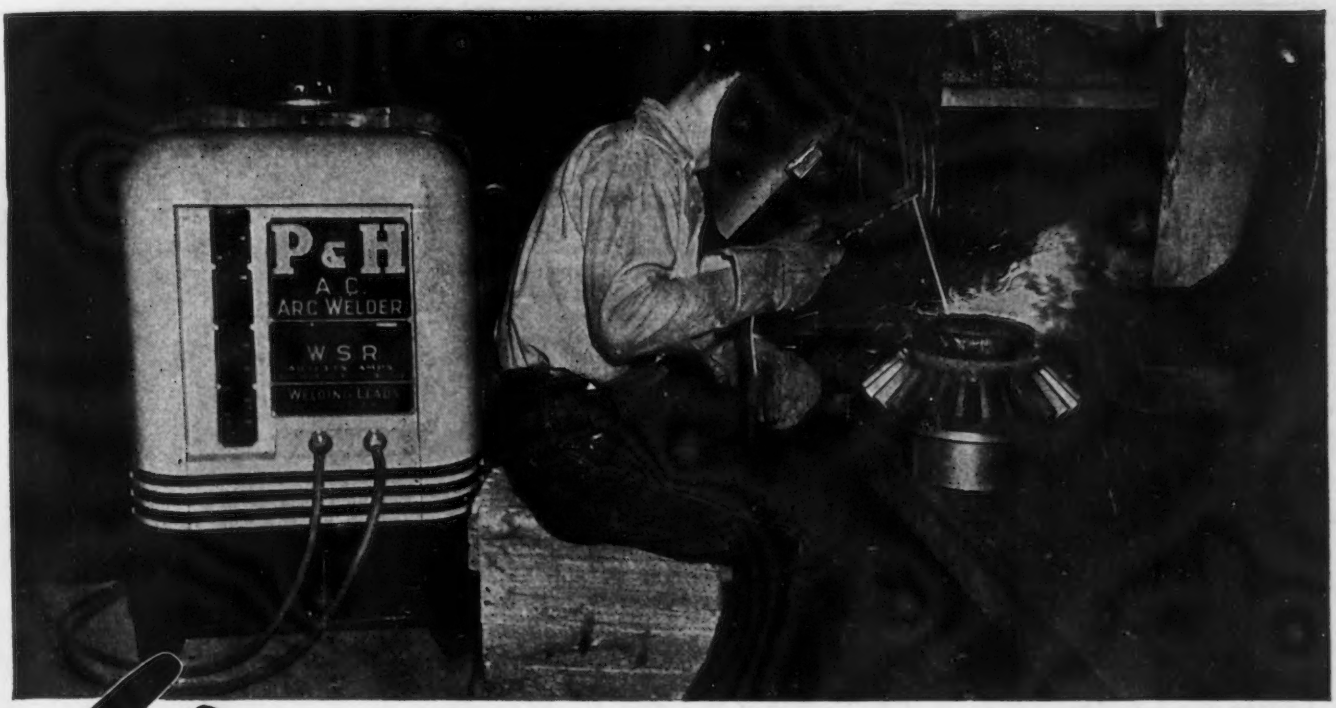
Although this was given them by diverting coal from more legitimate consumers, he said, they were "recalcitrant" toward the government's wishes in working out contracts.

Most coal operators here, including both commercial and captive, are still knee deep in the problem of attempting to interpret the recent contract, signed by Ickes and Lewis. Wage rates have not been determined yet, because the information has not come from Washington. Miners at practically every mine in this locality are still confused as to what they did or did not obtain. The arbitrary fixing of portal-to-portal time has created further confusion. Attempts are being made to get more authentic detail on actual traveling time.

Some miners, who claim their traveling time is less than 45 min. are balking at putting the extra time in on productive labor. Meanwhile, private opinion here, both among operators and observers, is that coal tonnage to be produced over the next few months will show no marked change from the amounts mined before the last coal strike.

The coke situation is tighter than ever, and resumption to normal operations at beehive coke plants took much longer than is generally supposed. The result has been that supplies for blast furnace fuel, coming from beehive coke ovens, are in the tightest position they have been for some time. Cooperation among steel producers is responsible for no serious shutdowns in blast furnace operations this past week. It was this part of Ickes' pronouncement, where he implied lack of cooperation, etc., which brought about the greatest reaction.

Harry M. Moses, president, H. C. Frick Coke Co., said "When it is clear that governmental agencies are in accord, I feel confident that the 'captive' coal mine operators will do everything within their power."



You BE THE JUDGE of this better A.C. welder

There *is* a difference in A.C. Welding — a big difference! You can quickly prove it to yourself with these improved machines produced by one of America's largest builders — and *users* — of arc welding equipment.

New Refinements

Here's the last word in simple, advanced design — all of the refinements you waited for — to help you weld faster, better, at a lower cost. Single, stepless heat control; creep-proof! An arc that's easier to control — that makes it easier to get uniform high quality welds. Higher operating efficiency — with no skimping on quality materials—saves on electrode and power costs.

WSR Rating Specify Usable Current

Every machine is rated on its WSR (Welding Service Range) which clearly specifies the *usable* welding current from minimum to maximum capacity. Models up to 1200 amperes.

Let modern A.C. welding help you speed up war production now — and cut costs afterward. See your P&H representative, or write us direct for complete information.

General Offices: 4401 W. National Ave., Milwaukee 14, Wisconsin

HARNISCHFEGER CORPORATION

ARC WELDERS • EXCAVATORS • ELECTRIC CRANES (P&H) MOTORS • HOISTS • WELDING ELECTRODES

P&H — AC — ARC WELDERS

Briefly Told—

Quantity Production of 2200 Hp. Plane Engine; Other Industrial News

• Quantity production of an air-cooled radial Wright Cyclone engine of 2200 hp., more power than the Cyclones that power Flying Fortresses, was announced recently by Myron B. Gordon, vice-president and general manager of the Wright Aeronautical Corp., Paterson, N. J. The new engine is called the Cyclone 18.

•

• Through the group warehousing plan of the Federal Emergency Warehouse Associations, the ODT made available to certain Government procurement agencies a cumulative total of 41,294,000 sq. ft. of private warehouse storage space in 32 cities during the fiscal year ended June 30. The ODT said that currently more than 50 per cent of all available public merchandise warehouse space in the major storage centers is occupied by Government property.

•

• Bell Aircraft Corp. has asked suppliers who feel they "are making more than their normal profit" on work for the company to return the excessive profit for refund to the government. Lawrence D. Bell, president, stated that some suppliers already had rebated a considerable amount of money when they found they were making more than a normal profit on the work. The refunds that Bell Aircraft has received have all been credited to the government, along with a copy of the letter from the supplier.

•

• The Saginaw Malleable Iron Div. of General Motors will operate a plant to be built and equipped by the DPC near Danville, Ill. The plant will be a one-story building, with a floor area of 130,000 sq. ft. It will be used for the manufacture of malleable castings for heavy duty truck axles.

•

• Locomotives on order for the U. S. Army and Lend-Lease in 1944, together with locomotives to be constructed for domestic railroad systems, represent a greater locomotive business than ever before on the books of the Baldwin Locomotive Works at one time, according to the company. During most of 1943, Baldwin, besides building locomotives, was a producer of Army tanks. However, the 1944 locomotive program will take the company out of tank production

entirely, and the job of reconverting is already under way.

•

• The proposed revision of Simplified Practice Recommendation R60-30, packaging of carriage, machine and lag bolts, has been accorded the required degree of acceptance by the industry, and became effective Nov. 15. The revised recommendation will be identified as SPR R60-43.

•

• Production of "rivnuts," a one-piece combination rivet and nut plate developed by the B. F. Goodrich Co. originally to fasten its rubber de-icers to airplane wings, has now expanded to the point where the unique fasteners can be offered for general industrial use, Harold F. Mosher of the company's industrial products division announced recently.

•

• The Milwaukee Association of Commerce is raising a fund of $40,000 to be used by its post-war planning committee next year. About 1500 answers to questionnaires sent out to 2500 firms in the Milwaukee area reveal an optimistic viewpoint. Walter Geist, Allis-Chalmers president, heads the post-war planning committee for Milwaukee.

•

• WPB chairman Donald M. Nelson announced recently that full work schedules should be observed in all war plants with the single exception of the Christmas week-end. Even on that occasion, it is requested that in mills where continuous operations are essential—such as blast furnaces and open hearth furnaces producing carbon steel, for instance—work be carried on over the Christmas week-end.

•

• Harleyville, S. C., has been selected by Defense Plant Corp. as the site for what is claimed to be the country's first aluminum-from-clay pilot plant. Use of the materials required has been approved by the WPB, and construction is already in progress. The contractor is Daniel Construction Co., Inc., of Greenville, S. C., and Birmingham, Ala.

•

• Under the sponsorship of the American Foundrymen's Association, the Third War Production Foundry Congress will be held April 25 to 28, 1944, in Buffalo. The 48th annual meeting of the association will be held in conjunction with a foundry show of materials, equipment and supplies for foundry use.

•

• Refrigeration equipment has a new use at the Santa Monica, Cal., plant of the Douglas Aircraft Co. The company has installed Carrier refrigeration equipment for use in quenching and storing aircraft parts of aluminum alloy.

Among the Week's Trade Notes

Michigan Tool Co., Detroit, has opened branch offices at 601 Tower Building, South Bend, Ind., and 1409 Union Central Life Insurance Building, Cincinnati. T. S. Mellen is district manager at South Bend, and E. W. Brock is district managr at Cincinnati.

•

General Electric Co. announced the formation of the General Electric Credit Corp., New York, to provide financing for war construction and production work in connection with contracts which involve the use of products of GE and its associates.

•

Rheem Mfg. Co. has leased for its Eastern sales and executive offices the 11th floor of the General Electric Building, 570 Lexington Avenue, New York.

•

Meehanite Metal Corp., New Rochelle, N. Y., announces that their Australian office has arranged with the Russell Allport Co., Ltd., Hobart, Tasmania, to manufacture Meehanite castings.

•

Cooper-Bessemer Corp., Mount Vernon, Ohio, has opened a third branch office on the Pacific Coast at 401 Rust Building, San Francisco. John G. McKissick will be manager of the new branch.

•

Detrola Corp., Detroit, and International Machine Tool Corp., Elkhart, Ind., have made a proposal to merge under the name of International Detrola Corp. Stockholders will meet the end of November to vote on the proposal.

•

Norman Products Co., Trenton, N. J., has opened a branch plant, the Atlantic Centerless Grinding Co., at 1063-67 McCarter Highway, Newark, N. J.

DPC Notes of the Week

Curtiss-Wright Corp., Buffalo, to provide additional facilities at a plant in Kentucky at a cost in excess of $2,400,000, making a total commitment of more than $13,950,000.

Goodyear Tire & Rubber Co., Akron, Ohio, to provide additional facilities at a plant in Ohio at a cost in excess of $470,000, making a total commitment of more than $6,300,000.

Vega Aircraft Corp., Burbank, Cal., to provide plant facilities in California at a cost in excess of $3,450,000.

General Motors Corp., Detroit, to provide plant facilities in Illinois at a cost in excess of $2,200,000.

Aeronca Aircraft Corp., Middletown, Ohio, to provide additional equipment at a plant in Ohio at a cost in excess of $35,000, making a total commitment of more than $1,150,000.

Chrysler Corp., Detroit, to provide additional equipment at a plant in Michigan at a cost in excess of $40,000, making a total commitment of more than $815,000.

Revere Copper & Brass, Inc., New York, to provide additional equipment at a plant in New York at a cost in excess of $100,000, making a total commitment of more than $600,000.

Genesee Brewing Co., Rochester, N. Y., to provide equipment at a plant in New York at a cost in excess of $140,000.

Bell & Gossett Co., Morton Grove, Ill., to provide equipment at a plant in Illinois at a cost in excess of $65,000.

Dillinger Distilleries, Inc., Ruffsdale, Pa., to provide equipment at a plant in Pennsylvania at a cost in excess of $60,000.

Avion, Inc., Los Angeles, to provide equipment at a plant in California at a cost in excess of $35,000.

The War Department announced Nov. 11:

1. Award of a contract to Peter Kiewit Sons Co., MacDougald Construction Co., and Western Contracting Corp., Sioux City, Iowa, for construction at an Air Forces installation in Dallas County, Texas, to cost in excess of one million dollars. This work is to be supervised by the Denison, Texas, District Office of the Corps of Engineers.

2. Authorization for construction at an Army Air Forces installation in Highlands County, Florida, to cost a million dollars. This work is to be supervised by the Jacksonville District Office of the Corps of Engineers.

PERSONALS

• **H. G. Texter** will resume his activities as chief field engineer in Tulsa, Okla., for Spang-Chalfant, Pittsburgh. **George M. Eaton,** who for many years represented the company as field engineer in California is retiring and will be succeeded by **James A. Kennedy,** who is being transferred from Tulsa to Los Angeles. **N. A. Rebarick** will succeed Mr. Kennedy as field engineer, with headquarters at Tulsa.

• **Francis J. Curtis** was elected a vice-president of Monsanto Chemical Co., St. Louis, recently. In 1915 Mr. Curtis joined the research department of the Merrimac Chemical Co., which in 1929 was absorbed by Monsanto Chemical Co.

• **Reginald E. Sturdy,** former assistant superintendent of the Fairfield Sheet Mill of the Tennessee Coal, Iron & Railroad C., Birmingham, has been made superintendent of the mill.

• **W. F. Newbery** has been appointed sales manager of the industrial division of Detrex Corp., Detroit. Mr. Newbery started with Detrex in 1934 as sales and service engineer in the northeastern states, later serving as Eastern region manager for several years and South Central region manager.

• **H. G. Coffey,** formerly manager of sales of the Aetna-Standard Engineering Co., Youngstown, has been elected vice-president in charge of sales and production.

• **W. E. Worth,** director of purchasing for International Harvester Co., Chicago, has, in addition, been named vice-president in charge of supply and inventory.

• **H. V. Gaertner,** assistant controller of the B. F. Goodrich Co., Akron, Ohio, since 1929, has been made assistant treasurer succeeding **Edward M. Martin,** appointed to overseas service in the international sales division.

• **John A. Hutcheson** has been appointed associate director of the Westinghouse Electric & Mfg. Co.'s research laboratories. He was formerly manager of engineering at the company's Baltimore radio division.

• **Michael N. Brady,** for the last 13 years associated with the United States Rubber Co. in various sales official capacities, has been appointed vice-president in charge of sales of the National Enameling & Stamping Co., Milwaukee.

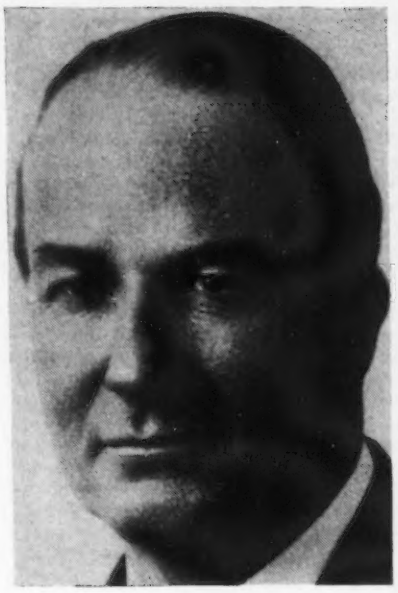
• **V. A. Guebard,** former superintendent of the Milwaukee works of the International Harvester Co., has been appointed works manager of the firm's truck manufacturing plants which includes the motor truck engine plant at Indianapolis, truck assembly plants at Fort Wayne, Ind., and Springfield, O., gun manufacturing plant at St. Paul, Minn., and truck plant at Chatham, Canada. Mr. Guehard started with the firm in 1927 as a tool designer at Fort Wayne.

• **J. Murray Whitworth** has been appointed to the Pittsburgh area as a sales representative of Jenkins Bros. He succeeds **John J. Simpson** who resigned to become general sales manager of Pittsburgh Gage & Supply Co. Mr. Whitworth has been connected with the company's Philadelphia branch for the past seven years.

• **J. Handly Wright,** executive vice-president of the Associated Industries of Alabama, has resigned from that organization to join the general staff of Monsanto Chemical Co., St. Louis. He will be head of the department of industrial and public relations.

• **M. M. Greer** has been elected vice-president in charge of engineering of Edwin L. Wiegand Co., Pittsburgh. Mr. Greer joined the company in 1928, as an engineer in the experimental department. **H. R. Miles** succeeds Mr. Greer as manager of industrial sales.

M. M. GREER, vice-president in charge of engineering, Edwin L. Wiegand Co., Pittsburgh.



MOREHEAD PATTERSON, chairman of the board, American Machine & Foundry Co., New York.

• **W. H. Maxwell** has been made general sales manager of the Wolverine Tube Div., Calumet & Hecla Consolidated Copper Co., Detroit. **R. F. Moody** was made assistant general sales manager.

• **C. B. Schmidt** has been elected president of the Farm Equipment Institute, farm equipment manufacturers organization. **George L. Gillette** becomes chairman of the executive committee.

• **William Campbell** has joined the Chicago district sales office of the Inland Steel Co., Chicago. He will handle a portion of the Iowa territory.

• **W. W. Galbreath** was appointed executive vice-president of the Pressed Metal Institute recently. Mr. Galbreath is president of Alliance Porcelain Products Co.

• **R. J. Russell,** vice-president and sales manager of the Century Electric Co., St. Louis, has been elected president of the Associated Industries of Missouri.

• **William R. Moore** has been made a vice-president of Norton Co., Worcester, in charge of national accounts, sales of refractories, boron carbide and pulpstones. He has held a number of executive positions in the company and formerly was general sales manager, abrasive division.

• **James B. Rosser** has been made administrative assistant to the president, Pullman Standard Car Mfg. Co.

• **Morehead Patterson** has been elected chairman of the board, American Machine & Foundry Co., New York. **Herbert H. Leonard** was elected president. Mr. Leonard is president-treasurer of Consolidated Packaging Machinery Corp., Buffalo, from which he will resign.

• **Harold I. Beadle** has been appointed sales manager for new products of Naugatuck Chemical Div., United States Rubber Co.

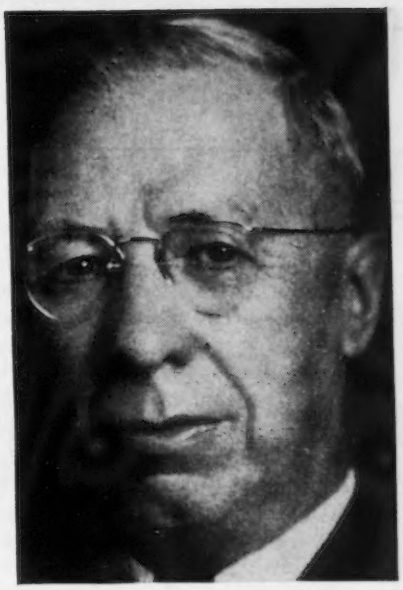
• **Ralph M. Johnson** has been appointed general sales manager of grinding wheels and abrasive grain for the Norton Co., Worcester. He has been Norton western sales manager since 1939.

• **L. F. McGlincy** has been appointed assistant manager of operations, Pittsburgh district of American Steel & Wire Co., subsidiary of U. S. Steel Corp. **Loren J. Westhaver** has been named general superintendent of the Donora, Pa., works succeeding Mr. McGlincy.

• **Reuel E. Warriner** has resumed duties with the International Nickel Co., Inc. He recently resigned from the Tank Automotive Center of the Army Ordnance Department.

• **Joseph D. O'Flaherty** has been made assistant manager in charge of sales and promotion of the United States Electrical Tool Co., Cincinnati. He was formerly branch manager of the Schacht Motor Co. of Columbus, Ohio.

EDWARD J. BURNELL, vice-president in charge of sales for Link-Belt Co., Chicago.



HERBERT L. LEONARD, president of American Machine & Foundry Co., New York.

• **Ray S. Wood**, since 1925 district manager of the Link-Belt Co. positive drive division, has been appointed plant manager at the Link Belt Supply Co. plant, Minneapolis, recently acquired by Link-Belt Co. Mr. Wood joined Link-Belt in 1914 in the engineering department at Philadelphia.

• **R. K. Myers**, recent chief of the X-Ray Section of the WPB, has been appointed sales manager of the Kelley-Koett Mfg. Co., Covington, Ky.

• **J. M. Willis** has recently been appointed Ohio state sales and engineering representative for the Briggs Clarifier Co., Washington. **Henry T. Moore** has been appointed general sales manager, and **E. K. Burgess** and **J. H. Nash** have been appointed assistant sales managers for the Automotive Div. and Industrial Div., respectively. **J. J. Stroud** has been appointed engineering and sales representative for the state of Kentucky. He will maintain headquarters in Paducah, Ky.

• **E. F. Russell** has been made manager and **R. T. Pennoyer** assistant manager of the Easthampton, Mass., works, electronics department, of the General Electric Co.

• **John B. Ross**, formerly with Linde Air Products Co. has been appointed to the West Coast engineering office of Handy & Harman.

• **A. C. Ryan** has joined the Houde Engineering Div. of the Houdaille-Hershey Corp. as director of sales. Mr. Ryan was formerly deputy director in charge of production service of the Detroit regional staff of the WPB.

• **E. G. Plowman** has been appointed vice-president in charge of traffic by United States Steel Corp. of Delaware. Mr. Plowman was formerly traffic manager of Colorado Fuel & Iron Co.

• **T. W. Bonnevier**, tax accountant of Acme Steel Co., Chicago, was named director of publications at a recent meeting of the Chicago chapter of the National Association of Cost Accountants.

• **Harry Schlichter**, associated with the Beardsley & Piper Co., since 1922, has been appointed manager of that company. Mr. Schlichter entered the foundry industry in 1910 as a molder's helper with the Henry Pridmore Molding Machine Co., and in 1917 was made general superintendent of the company.

OBITUARY...

• **Manuel Rogers**, president of the Universal Unit Machinery Corp., Milwaukee, died Nov. 9.

• **Hugh J. Homewood**, vice-president of the Gisholt Machine Co., Madison, Wis., died at his home Nov. 8 after a long illness. He was 49 years of age.

• **Raymond Lock**, sales engineer for the N. L. Kuehn Co., Milwaukee, died Nov. 8. He was 48 years of age.

• **Albert Lahmann**, a director of the A. George Schulz Box Co., Milwaukee, died Nov. 9 after a long illness.

• **Henry L. Grede**, director and founder of the Grede Founders, Inc., Milwaukee, died recently. He was 78 years of age.

• **Samuel Mack Havens**, vice-president of Wyman-Gordon Co., died recently.

• **George E. Vertrees**, manager of the credit department of the Northwestern Steel & Wire Co., died Nov. 13.

• **Jacob Frederick Dittus** for many years associated with the Motch & Merryweather Machinery Co. as a sales engineer died recently.

• **George D. Benham**, died suddenly on Nov. 15. He was connected with the sales department of Bushwick Iron & Steel Co., Inc., Brooklyn. He was 66 years of age.

• **Arthur C. Brauer**, automotive engineer for the Hudson Motor Car Co. for the past 13 years died recently.

MACHINE TOOLS

. . . News and Market Activities

Direct Sales Extended by Monarch

Sidney, Ohio

• • • **Another step toward** a completely integrated sales organization was taken last week by Monarch Machine Tool Co., when Wendel E. Whipp, president, announced that two new branch sales offices would be opened in Detroit and Cleveland. Strong, Carlisle & Hammond Co., one of the old line dealers in the Detroit-Cleveland area, had been handling Monarch distribution for many years. This move is in line with the efforts by Monarch to establish its own sales outlets.

The Monarch outfit is and has been an unusually progressive organization, and it points this move out as a definite and tangible attempt to set up for the post-war period. With Cleveland and Detroit expected to be an exceptionally competitive but nonethe-less lucrative market in the post-war era, the degree of sales efforts considered necessary can be maintained at will through such direct selling methods.

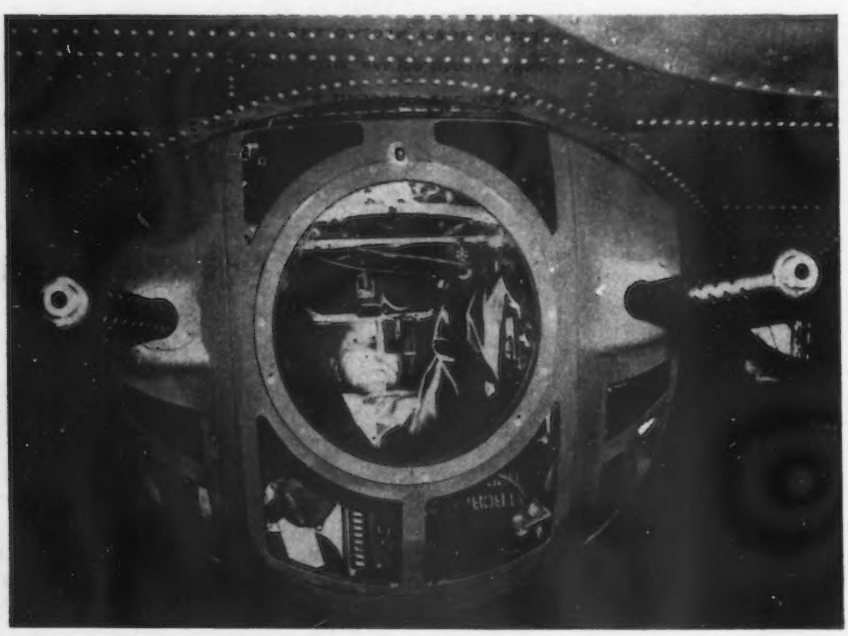
Monarch still has a rather substantial backlog of orders for machine tools, although production of the rotating, elevating, and firing mechanism for Bofors anti-aircraft guns has started at the Sidney plant. This production started within the past few weeks and for the first time put Monarch into the manufacture of war products other than machine tools.

Another contract, several times larger than the gun part contract, has been taken for bomber engine accessories. Because the machine tool order backlog is being reduced so much more slowly than was expected, however, the work on the engine accessories has not yet begun and cannot be started until this backlog is more nearly exhausted. The new job requires the physical removal of considerable of the present manufacturing facilities and the installation of about 150 new machines. These new machines cannot be moved in until there is space made available through the removal of machine tool production equipment. In all probability, it will be the heavy planers and similar equipment required in machining the bed castings and other basic parts that will be moved out.

How quickly this can be achieved is anyone's guess. Because of the fact that there has been internal friction in the plant caused by union organization moves which have been thwarted to date by the employees themselves through elections held by the National Labor Relations Board, and because Mr. Whipp indicated that backlogs are "being reduced so much more slowly than was anticipated that they are now delaying the start of work on urgent additional war contracts," the indications are that perhaps there is a slowdown at the plant. Besides workers in machine tool plants generally have feared that the end of machine tool contracts would bring an end to steady work. However, with such large contracts as are now held by Monarch Machine Tool Co. for other than machine tools, the surety of steady work over a long period of time might promote a stepup in lathe output so that work on the new contracts can be commenced.

LINING UP SIGHTS: The gunner operating the ball turret of the Boeing Fortress curls up inside the turret and spins it in whatever direction enemy planes appear. The turret is located amidships on the under side of the fuselage and is equipped with automatic sights.

World Wide Photos



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Modest Flow of Orders

Cincinnati

• • • **A modest flow of new business** into the local market continues to sustain machine tool builders' optimism, since the reported new business, under normal conditions, would be considered reasonably satisfactory. Backlogs continue to be rapidly reduced, with the current pile estimated to last probably through the first quarter of next year. Of course, there are exceptions since the lighter manufacturers will be through before that time and the heavy manufacturers may go a trifle beyond that. As a matter of fact, one or two heavy machine tool builders have indicated that present operations would be continued perhaps through the whole of the first half of next year, but this is not the general rule.

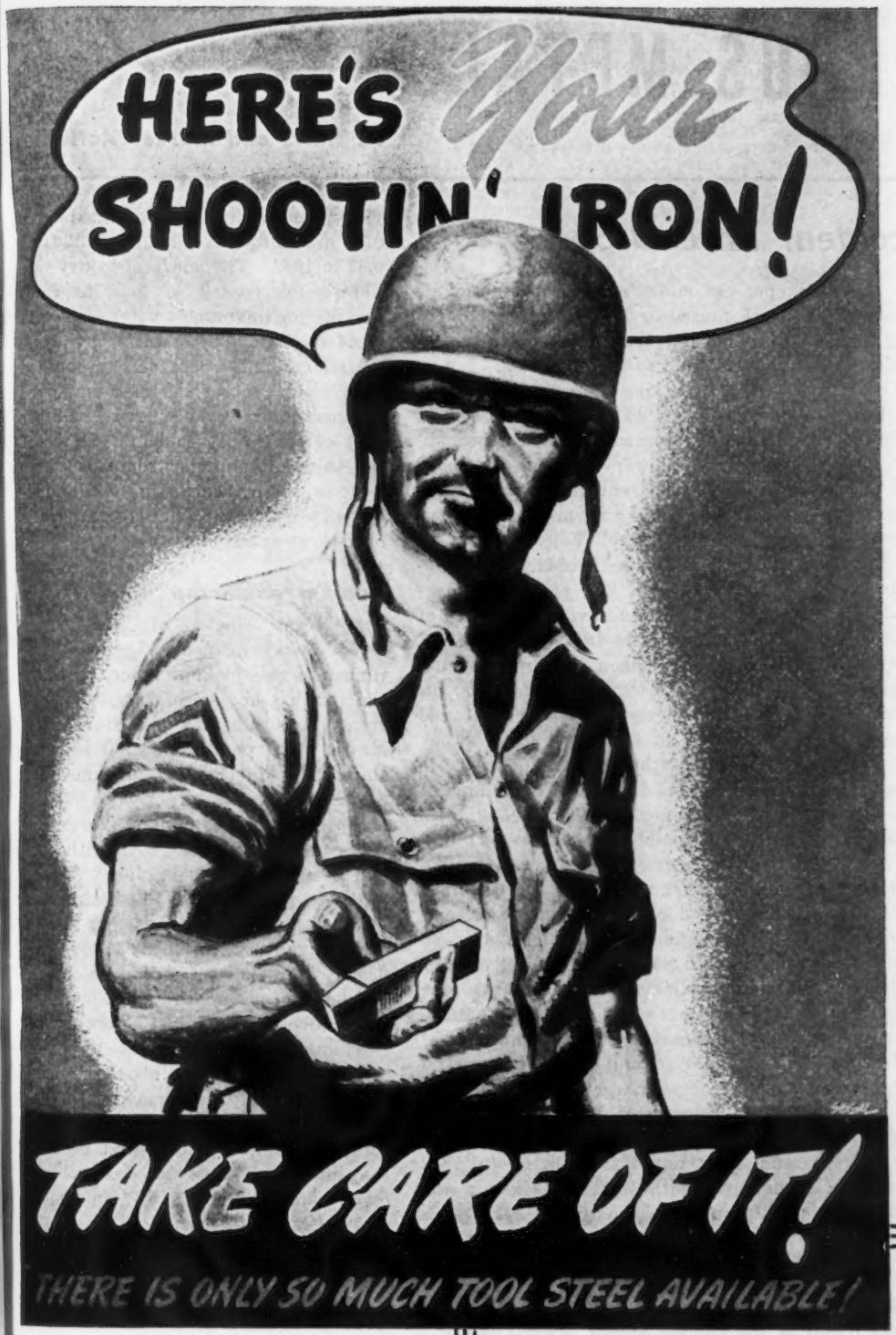
Administrative difficulties, particularly with renegotiation and contract termination problems, engage the attention of most executives in the area as they seek to cut through red tape.

•

Reporting Reduced for Diamond Die Producers

Washington

• • • **WPB issued** Amendment 1 to General Conservation Order M-181 on Nov. 16 eliminating monthly reports from consumers of non-critical size diamond dies. These consumers will hereafter file reports once a year.



One in a series of 2⅓ by 3½ foot posters in color, designed to help reduce tool breakage through worker education, made available to users of **"TOMAHAWK"** tools, without charge.

For complete information wire or write

GENESEE TOOL COMPANY
FENTON, MICHIGAN

NON-FERROUS METALS

. . . News and Market Activities

Copper Mine Accident Rate Drops

• • • **Increased employment** and a lower accident-frequency rate were recorded by the copper mining industy of the United States in 1942 according to a report made by Dr. R. R. Sayers, director of the Bureau of Mines, to Secretary of the Interior, Harold L. Ickes.

Reports for 1942 furnished to the bureau by 82 individual copper companies which operated 107 mines revealed a total of 23,222 men employed in and about the mines, an increase of nearly 8 per cent over 1941. The total volume of labor performed rose from over 55.1 million manhours in 1941 to nearly 60.4 million in 1942, an increase of almost 10 per cent. As these gains suggest, the average employee had a longer period of work in 1942, the increase amounting to 6 workdays per employee.

Accidents at the mines resulted in the death of 50 employees and in nonfatal injuries to 2985. Nonfatal injuries were those which disabled a man for more than the remainder of the day on which the accident occurred. The fatality rate declined from 1.12 per million manhours in 1941 to 0.83 per million manhours in 1942. The injury rate of 49.43 represented an improvement compared with the rate of 53.71 for 1941.

At underground mines the greatest number of accidents occurred as a result of falls of rock or ore from roof or wall, haulage and handling materials (other than rock or ore). At open-cut mines most of the accidents were caused by hand tools, machinery (other than locomotives and power shovels) and falls of persons.

An 11 per cent increase in men employed and a 25 per cent increase in manhours of work performed in addition to a lower accident-frequency rate were the feature characteristics of the lead and zinc mining industry in the Mississippi Valley States in 1942, compared with 1941.

Reports from 299 companies operating 430 mines revealed a total of 9555 employees in 1942, a gain of 921 over the 8634 men employed during the previous year at 338 mines. Included in these figures for lead and zinc mines in the Mississippi Valley States are those for fluorspar in Kentucky and Illinois. The volume of work performed in 1942, measured in terms of manhours, was over 21 million, an increase of more than 4 million manhours over the 16.9 million worked in 1941. The average employee worked 277 days in 1942 compared with 247 days the year before. Oklahoma, Missouri and Kansas (the Tri-State Area), in the order named, were the leading states in number of men employed and manhours worked during the year.

The Bureau of Mines' survey revealed that there were 12 fatalities and 1131 nonfatal injuries in 1942 compared with 12 fatal accidents and 992 nonfatal accidents in 1941. Since the manhours of work increased last year, the fatality rate declined from 0.71 per million manhours in 1941 to 0.57 in 1942. The nonfatal injury rate likewise decreased in 1942 to 53.58 per million manhours compared with 58.64 in 1941.

Underground operations accounted for 88 per cent of the men employed and manhours worked and over 92 per cent of the total accidents. Most of the injuries to underground workers were caused by rock or ore while loading at working face, haulage and falls of rock or ore from roof or wall.

Number of men employed, manhours of employment, and accident rates per million manhours at copper mines in the United States, 1931-1942

Year	Men employed	Manhours of employment	Killed		Injured	
			Number killed	Rate per million manhours	Number injured	Rate per million manhours
1931	19,687	41,019,314	51	1.24	2,580	62.90
1932	9,555	18,608,421	23	1.24	859	46.16
1933	6,976	13,471,547	14	1.04	734	54.49
1934	8,084	14,726,617	12	.81	669	45.43
1935	10,188	22,293,255	19	.85	1,466	65.76
1936	14,102	34,900,287	38	1.09	2,819	80.77
1937	21,175	51,982,104	49	.94	4,938	94.99
1938	17,582	34,629,942	24	.69	2,098	60.58
1939	18,436	42,097,862	38	.90	2,481	58.93
1940	19,498	48,672,053	48	.99	2,575	52.91
1941	21,576	55,130,086	62	1.12	2,961	53.71
1942	23,222	60,390,109	50	.83	2,985	49.43

Non-Ferrous Scrap Stocks Rise

• • • **Total stocks of** non-ferrous scrap metal in dealers' yards continued to rise in September, marking the sixth successive inventory increase according to the Bureau of Mines. A 1 per cent slump brought shipments of scrap to consumers in September down slightly to 74,480 short tons, the low point for 1943. After a continuous 3 month decline, net receipts gained 3 per cent to total 78,374 short tons in September. The 4 per cent rise in total inventory to 102,963 tons reflected increases in aluminum, brass, and lead scrap, and brought stocks up to the level recorded last February.

Aluminum scrap and some types of brass mill scrap still glutted the market, with supply far in excess of demand. The situation in aluminum scrap was relieved somewhat because the difference between dealers' receipts and shipments to consumers was less than in past months.

This report does not include all shipments of scrap to consumers because a much larger tonnage goes directly from the generator to the consumer without passing through the dealer trade. Figures have been adjusted to include the transactions of virtually all non-ferrous scrap metal dealers in the United States exclusive of peddlers and auto wreckers.

Premium Policy Clarified

• • • **WPB last week** issued a clarification of the statement of policy regarding limitations on B premium payments to lead producers. The board explained that the term "mines not already operating" as used in the statement issued Oct. 27, means mines which began work subsequent to that date.

REFINER, SMELTER PRICES

(Cents per lb. unless otherwise noted)

Aluminum, 99+%, del'd	15.00
Aluminum, No. 12 Fdy., (No. 2)	13.50
Aluminum, deoxidizing grades	12.50 to 13.75
Antimony, Asiatic, New York	Nominal
Antimony, American, f.o.b. Laredo, Tex.	14.50
Arsenic, prime white, 99%	4.00
Brass, 85-5-5-5 ingots (No. 115)	12.25
Cadmium, del'd	90.00
Cobalt, 97-99% (dollars per lb.)	$2.11
Copper, electro, Conn. Valley	12.00
Copper, electro, New York	11.75
Copper, lake	12.00
Copper, beryllium, 3.75-4.25% Be; dollars per lb. contained Be	$15.00
Gold, U. S. Treas., dollars per oz.	$35.00
Indium, 99.5%, dollars per troy oz.	$10.00
Iridium, dollars per troy oz.	$165.00
Lead, St. Louis	6.35
Lead, New York	6.50
Magnesium, 99.9+%, carlots	21.50
Magnesium, 12-in. sticks, carlots	30.00
Mercury, dollars per 76-lb. flask, f.o.b. shipping point or port of entry	$191 to $193.00
Nickel, electro	35.00
Palladium, dollars per troy oz.	$24.00
Platinum, dollars per oz.	$35.00
Silver, open market, New York, cents per oz.	44.75
Tin, Straits, New York	52.00
Zinc, East St. Louis	8.25
Zinc, New York	8.67

Copper, Copper Base Alloys

(Mill base, cents per lb.)

	Extruded Shapes	Rods	Sheets
Copper	20.87	....	20.87
Copper, H.R.	....	17.37	....
Copper, drawn	....	18.37	....
Low brass, 80%	....	20.40	20.15
High brass	....	....	19.48
Red brass, 85%	....	20.61	20.36
Naval brass	20.37	19.12	24.50
Brass, free cut	....	15.01	....
Commercial bronze, 90%	....	21.32	21.07
Commercial bronze, 95%	....	21.53	21.28
Manganese bronze	24.00	....	28.00
Phos. bronze, A, B, 5%	....	36.50	36.25
Muntz metal	20.12	18.87	22.75
Everdur, Herculoy, Olympic or equal	....	25.50	26.00
Nickel silver, 5%	....	28.75	26.50
Architect bronze	19.12	....	....

Aluminum

(Cents per lb., subject to extras on gage, size, temper, finish, factor number, etc.)

Tubing: 2 in. O.D. x 0.065 in. wall 2S, 40c. (½H); 52S, 61c. (O); 24S, 67½c. (T).

Plate: 0.250 in. and heavier; 2S and 3S, 21.2c.; 52S, 24.2c.; 61S, 22.8c.; 24S, 24.2c.

Flat Sheet: 0.188 in. thickness; 2S and 3S, 22.7c. a lb.; 52S, 26.2c.; 61S, 24.7c.; 24S, 26.7c.

2000-lb. base for tubing; 30,000-lb. base for plate, flat stock.

Extruded Shapes: "As extruded" temper; 2000-lb. base. 2S and 3S, factor No. 1 to 4, 25.5c.; 14S, factor No. 1 to 4, 35c.; 17S, factor No. 1 to 4, 31c.; 24S, factor No. 1 to 4, 34c.; 53S, factor No. 1 to 4, 28c.; 61S, factor No. 1 to 4, 28½c.

The factor is determined by dividing perimeter of shape by weight per lineal foot.

Wire, Rod and Bar: Base price; 17ST and 11ST-3, screw machine stock. Rounds: ¼ in., 28½c. per lb.; ½ in., 26c.; 1 in., 24½c.; 2 in., 23c. Hexagonals: ¼ in., 34½c. per lb.; ½ in., 28½c.; 1 in., 25½c.; 2 in., 25½c. 2S, as fabricated, random or standard lengths, ¼ in., 34c. per lb.; ½ in., 25c.; 1 in., 24c.; 2 in., 23c. 24ST, rectangles and squares, random or standard lengths. 0.093-0.187 in. thick by 1.001-2.000 in. wide, 33c. per lb.; 0.751-1.500 in. thick by 2.001-4.000 in. wide, 29c.; 1.501-2.000 in. thick by 4.001-6.000 in. wide, 27½c.

Magnesium

Sheet, rod, tubes, bars, extruded shapes subject to individual quotation. Metal turnings: 100 lb. or more, 46c. a lb.; 25 to 90 lb., 56c.; less than 25 lb., 66c.

NON-FERROUS SCRAP METAL QUOTATIONS

(OPA basic maximum prices, cents per lb., f.o.b. point of shipment, subject to quality, quantity and special preparation premiums)

Copper, Copper Base Alloys

OPA Group 1	
No. 1 wire, No. 1 heavy copper	9.75
No. 1 tinned copper wire, No. 1 tinned heavy copper	9.75
No. 2 wire, mixed heavy copper	8.75
Copper tuyeres	8.75
Light copper	7.75
Copper borings	9.75
Lead covered copper wire, cable	6.00*
Lead covered telephone, power cable	6.04
Insulated copper	5.10*
OPA Group 2	
Bell metal	15.50
High grade bronze gears	13.25
High grade bronze solids	11.50*
Low lead bronze borings	11.50*
Babbitt lined brass bushings	13.00
High lead bronze solids	10.00*
High lead bronze borings	10.00*
Red trolley wheels	10.75
Tinny (phosphor bronze) borings	10.50
Tinny (phosphor bronze) solids	10.50
Copper-nickel solids and borings	9.25
Bronze paper mill wire cloth	9.50
Aluminum bronze solids	9.00
Soft red brass (No. 1 composition)	9.00
Soft red brass borings (No. 1)	9.00
Gilding metal turnings	8.50
Unlined standard red car boxes	8.25
Lined standard red car boxes	7.75
Cocks and faucets	7.75
Mixed brass screens	7.75
Red brass breakage	7.50
Old nickel silver solids, borings	6.25
Copper lead solids, borings	6.25
Yellow brass castings	6.25
OPA Group 3	
Yellow brass soft sheet clippings	8.625
Yellow rod brass turnings	8.375
Zincy bronze borings	8.00
Zincy bronze solids	8.00
Fired rifle shells	8.25
Brass pipe	8.00
Old rolled brass	7.75
Admiralty condenser tubes	8.00
Muntz metal condenser tubes	7.50
Plated brass sheet, pipe reflectors	7.50
Manganese bronze solids	7.25[1]
Manganese bronze solids	6.25[2]
Manganese bronze borings	6.50[1]
Manganese bronze borings	5.50[2]
OPA Group 4	
Automobile radiators	7.00
OPA Group 5	
Refinery brass	5.00*

*Price varies with analysis. [1] Lead content 0.00 to 0.40 per cent. [2] Lead content 0.41 to 1.00 per cent.

Aluminum

Plant scrap, segregated	
2S solids	9.00
All other solids	8.50
Borings and turnings	
W'rt alloys (17S, 18S, 32S, 52S)	7.50
High grade alloys	7.00
Low grade alloys	6.50
Plant scrap, mixed	
All solids	7.50
Borings and turnings	5.50
Obsolete scrap	
Pure cable	9.00
Old sheet and utensils	7.50
Old castings and forgings	8.00
Pistons, free of struts	8.00
Pistons, with struts	6.00
Old alloy sheet	7.00

For old castings and forgings, pistons, sheets, add ½c. lb. for lots 1000 to 19,999 lb.; for other scrap add 1c.; for lots over 19,999 lb. add 1½c. a lb.

Magnesium

Segregated plant scrap	
Pure solids and all other solids, exempt	
Borings and turnings	8.00
Mixed, contaminated plant scrap	
Grade 1 solids	11.00
Grade 1 borings and turnings	7.00
Grade 2 solids	9.00
Grade 2 borings and turnings	5.00

For lots over 1499 lb. add 1c. per lb.

Zinc

New zinc clippings, trimmings	7.25
Engravers', lithographers' plates	7.25
Old zinc scrap	5.75
Unsweated zinc dross	5.80
Die cast slab	5.80
New die cast scrap	4.95
Radiator grilles, old and new	4.95
Old die cast scrap	4.50

Lead

Deduct 0.55c. a lb. from refined metal basing point prices for soft and hard lead inc. cable, for f.o.b. point of shipment price.

Nickel

Ni content 98+%, Cu under ½%, 26c. per lb.; 90 to 98% Ni, 26c. per lb. contained Ni.

ELECTROPLATING ANODES AND CHEMICALS

Anodes

(Cents per lb., f.o.b. shipping point)

Copper: Cast, elliptical, 15 in. and longer	25⅛
Electrolytic, full size	22⅞
cut to size	30⅛
Rolled, oval, straight, 15 in. and longer	23¼
Curved	24¼
Brass: Cast, 82-20, elliptical, 15 in. and longer	23⅝
Zinc: Cast, 99.99, 16 in. and over	16¼
Nickel: 99% plus, cast	47
Rolled, depolarized	48
Silver: Rolled, 999 fine per Troy (1-9) oz., per oz.	58

Chemicals

(Cents per lb., delivery from New York)

Copper cyanide, tech., 100-lb. bbls. 1-5	5.65
Copper sulphate, 99.5 crystals, bbls.	13.00–13.50
Nickel salts, single, 425-lb. bbls.	34.00
Silver cyanide, 100 oz. lots	40.82–41.136
Sodium cyanide, 96% dom., 100-lb. dms.	0.15
Zinc cyanide, 100-lb. dms.	33.00
Zinc sulphate, 89% crystals, bbls.	6.80

SCRAP

. . . News and Market Activities

Market Dull; Inventories Lagging

• • • **The scrap market** last week appeared to have few highlights worthy of note. Most characteristics were of a continuing nature and little change is seen in the immediate future. Cast scrap is still reported in poorest supply but the demand for heavy melting grades continues brisk in most quarters. Straggling reports on the scrap drive have reflected poor results although most reports were based on household collections which at best were not expected to be very productive. Dormant scrap collections and the flow of railroad and production scrap is considered to be in good volume.

A move to encourage the scrap trade through higher prices or subsidies and better organization of the scrap industry is discussed in this week's "Washington" column on page 76.

Several areas report exceedingly poor yard influx causing some concern over supply during the impending Winter. Yard inventories are not being built-up and continuing manpower and gasoline shortages leave little hope for improvement in this condition. Supplies in Chicago are reported to have been banned from delivery to two large producers and one large foundry in favor of some smaller mills and foundries in less favorable position. One New England mill has notified the trade it will accept no more turnings from yards but will direct from producers, the implication being that the alloy contamination has been troublesome.

An abrupt about face in steel production in several areas is beginning to reflect some change in the demand for open hearth scrap. Republic Steel Corp. with nine open hearth furnaces down in the Youngstown-Massillon area and three more down at Buffalo has eased the demand in those areas somewhat.

•

Institute Group to Study Scrap Supply and Demand

Washington

• • • **To obtain a clear picture** of requirements and supply of iron and steel scrap in 1944, the Institute of Scrap Iron & Steel, Inc., Washington, has appointed a Procurement committee under the chairmanship of C. E. Wright, vice-president of the Charles Dreifus Co., Philadelphia.

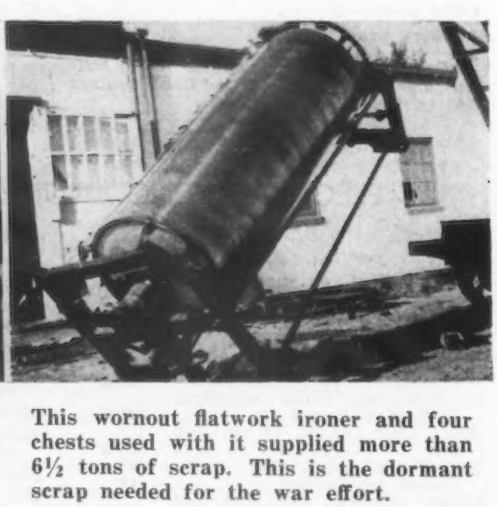
The formal report of this committee will be presented to the War Production Board and to the 16th Annual Convention and Victory Conference of the Institute to be held in Cleveland next Jan. 12-13.

Laundry Industry Rolls Out Dormant Scrap

. . . One of the hardest hit industries of the war both in manpower shortages and through being overloaded with work, here is evidence that the laundries are doing there part to roll out dormant scrap.

Photos courtesy Laundry & Dry Cleaners Machinery Mfg. Assoc.

Two 3-in. anti-aircraft guns could be made using the scrap supplied in these two scrapped laundry water softening units.



This wornout flatwork ironer and four chests used with it supplied more than 6½ tons of scrap. This is the dormant scrap needed for the war effort.

PITTSBURGH—No important change in the scrap situation here last week. Open hearth and blast furnace grades still in good demand.

•

CHICAGO—In the past fortnight the War Production Board has directed two Chicago district mills and one large foundry not to accept further deliveries of scrap in an effort to divert shipments to mills and foundries whose positions are less favorable. The cast scrap situation continues critical with foundries reported taking truckload shipments direct from dealers.

•

BIRMINGHAM — Several Alabama scrap dealers who have baling presses for light sheet scrap have petitioned the Alabama Public Service Commission for permission to reduce minimum weight per car on light sheet material, 16-ga. and lighter. They have asked permission to reduce minimum weight to 30,000 lb per car on all intrastate shipments of this material. Meanwhile, open hearth grades are still active here while foundry and electric furnace grades are stagnant. Shipyard scrap at Gulf ports is moving on allocations to Northern points.

•

BOSTON—Common expression of the trade is that business, if anything, is slower. Growing difficulty in securing new and holding old workers undoubtedly accounts for the attitude of yards, at least. Heavy scrap is particularly hard to get, including breakable cast. Lighter is in modest supply, but mills are discriminating, especially in the case of turnings.

•

PHILADELPHIA—Shipments of scrap are very light. Every mill is working down its stockpile, but the inventory of one mill was so low that Washington granted its request to allocate scrap from northern New Jersey.

•

NEW YORK—Scrap is moving out very slowly, but apparently mills are not expressing much concern over light receipts. Conditions remain unchanged here.

•

CINCINNATI—Dealers in this area are becoming anxious over the lack of visible yard supply in view of the approach of cold weather and the resulting transportation difficulties that normally arise at this time of the year. Flow of iron and steel scrap is not in sufficient quantity to enable building of substantial inventories, but the current movement appears to be adequate to supply present needs. Open hearth and blast furnace scrap is particularly touchy.

•

ST. LOUIS—Receipts of scrap iron in the St. Louis industrial district continue light, with No. 2 melting steel, the most needed item, especially low. Railroad offerings of this grade have been small.

IRON AND STEEL (OTHER THAN RAILROAD) SCRAP

(All Prices Are Per Gross Ton)

	BASIC OPEN HEARTH GRADES		BLAST FURNACE GRADES				ELECTRIC FURNACE, ACID OPEN HEARTH AND FOUNDRY GRADES									
							Low Phos.		Heavy Structural and Plate			Foundry Steel				
	No. 1 & 2 Hvy. Melt. No. 1 Cp. Blk. Shts. No. 1 & 2 Bundles No. 1 Busheling	Unbaled* Machine Shop Turnings	Mixed Borings and Turnings	Cast Iron Borings	Shoveling Turnings	No. 2 Busheling	Billet, Bloom, Forge Crops	Bar Crops, Punchings Plate Scrap and Cast Steel	3 ft. and Under	2 ft. and Under	1 ft. and Under	2 ft. and Under	1 ft. and Under	Auto. Springs, and Crankshafts	Alloy Free Low Phos. and Sulphur Turnings	Heavy Axle and Forge Turn. First Cut	Electric Furnace Bundles
Pittsburgh, Brackenridge, Butler, Monessen, Midland, Johnstown, Sharon, Canton, Steubenville, Warren, Youngstown, Weirton	$20.00	$15.00	$15.00	16.00	$17.00	$17.50	$25.00	$22.50	$21.50	$22.00	$22.50	$21.50	$22.00	$21.00	$18.00	$19.50	$21.00
Cleveland, Middletown, Cincinnati, Portsmouth	19.50	14.50	14.50	15.50	16.50	17.00	24.50	22.00	21.00	21.50	22.00	21.00	21.50	20.50	17.50	19.00	20.50
Chicago, Claymont, Coatesville, Conshohocken, Harrisburg, Phoenixville, Sparrows Point	18.75	13.75	13.75	14.75	15.75	16.25	23.75	21.25	20.25	20.75	21.25	20.25	20.75	19.75	16.75	18.25	19.75
Ashland, Ky.	19.50	14.50	14.50	15.50	16.50	17.00	24.50	22.00	21.00	21.50	22.00	21.00	21.50	20.50	17.50	19.00	20.50
Buffalo, N. Y.	19.25	14.25	14.25	15.25	16.25	16.75	24.25	21.75	20.75	21.25	21.75	20.75	21.25	20.25	17.25	18.75	20.25
Bethlehem, Pa.; Kokomo, Ind.	18.25	13.25	13.25	14.25	15.25	15.75	23.25	20.75	19.75	20.25	20.75	19.75	20.25	19.25	16.25	17.75	19.25
Duluth, Minn.	18.00	13.00	13.00	14.00	15.00	15.50	23.00	20.50	19.50	20.00	20.50	19.50	20.00	19.00	16.00	17.50	19.00
Detroit, Mich.	17.85	12.85	12.85	13.85	14.85	15.35	22.85	20.35	19.35	19.85	20.35	19.35	19.85	18.85	15.85	17.35	18.85
Toledo, Ohio	....	12.85	12.85	13.85	14.85	15.35	....	....	....	....	....	....	....	....	....	....	....
St. Louis, Mo.	17.50	12.50	12.50	13.50	14.50	15.00	22.50	20.00	19.00	19.50	20.00	19.00	19.50	18.50	15.50	17.00	18.50
Atlanta, Ga.; Alabama City, Ala.; Birmingham, Los Angeles; Pittsburg, Cal.; San Francisco	17.00	12.00	12.00	13.00	14.00	14.50	22.00	19.50	18.50	19.00	19.50	18.50	19.00	18.00	15.00	16.50	18.00
Minnequa, Colo.	16.50	11.50	11.50	12.50	13.50	14.00	21.50	19.00	18.00	18.50	19.00	18.00	18.50	17.50	14.50	16.00	17.50
Seattle, Wash.	14.50	9.50	9.50	10.50	11.50	12.00	19.50	17.00	16.00	16.50	17.00	16.00	16.00	15.00	12.50	14.00	15.50

*Baled turnings are $5 per gross ton higher.

BUNDLES: Tin can bundles are $4 below dealers' No. 2 bundles No. 3 bundles are $2 less than No. 1 heavy melting.

AT NEW YORK CITY or Brooklyn, the maximum shipping point price is $15.33 for No. 1 heavy melting, f.o.b. cars, f.a.s. vessel or loaded on truck. Minimum set at $14 per grosston at any shipping point in U. S. Other grades carry differentials similar to those in table. New Jersey prices must be computed on basis of all-rail. At Boston the maximum is $15.05 for No. 1 f.o.b. cars, f.a.s. vessel or loaded on trucks. Shipments from a New England shipping point to a consumer outside New England carry maximum transportation charge of $6.66 per ton.

SWITCHING CHARGES: Deductions for shipping points within basing points (cents per gross ton) are: Pittsburgh, Brackenridge, 55c.; Midland, Johnstown, Sharon, Youngstown, Warren, Weirton, Cleveland, Toledo, Los Angeles, San Francisco, 42c.; Butler, Monessen, Canton, Steubenville, Cincinnati*, Portsmouth, Ashland, Coatesville, Harrisburg, Phoenixville, Bethlehem, Kokomo, Duluth, St. Louis, 28c.; Buffalo, Claymont, 36c.; Conshohocken, 11c.; Atlanta, Birmingham, 32c.; Pittsburg, Cal., 42c.; Middletown, 14c.; Sparrow's Point, 11c.; Chicago, 84c.; Detroit, 53c.; Alabama City, 26c.; Minnequa, 22c.; Seattle, 38c. *At Cincinnati, for basic open hearth grades, foundry steel and auto springs and crankshafts, deduct 80c. per ton.

PITTSBURGH basing point includes switching districts of Bessemer, Homestead, Duquesne, Munhall and McKeesport. Cincinnati basing point includes Newport, Ky., switching district. St. Louis includes switching districts of Granite City, East St. Louis, Madison, Ill. San Francisco includes switching districts of S. San Francisco, Niles and Oakmont, Cal. Claymont, Del., includes the switching point of Chester, Pa. Chicago includes Gary, Ind., switching district.

MAXIMUM SHIPPING POINT PRICE—Where shipment is by rail or vessel, or by combination of rail and vessel, the scrap is at its shipping point when placed f.o.b. railroad or f.a.s. vessel. In such cases, the maximum shipping point prices shall be: (a) For shipping points located within a basing point, the price listed in the table above for the scrap at the basing point in which the shipping point is located minus the lowest established switching charge for scrap within the basing point and (b) for shipping points located outside the basing point, the price in table above at the most favorable basing point minus the lowest transportation charge by rail or water or combination thereof. In lieu of dock charge add 75c. a ton*, but 50c. if moved by deck scow or railroad lighter. Shipping by motor vehicle: The scrap is at its shipping point when loaded. For shipping points located within basing points take price listed in table minus applicable switching charge. If located outside a basing point, the price at the most favorable basing point minus lowest established charge for transporting by common carrier. If no established transportation rate exists, the customary costs are deducted. Published dock charges prevail. If unpublished include 75c.* For exceptions see official order.

UNPREPARED SCRAP: For unprepared scrap, maximum prices shall be $3.50 (and in the case of the material from which No. 1 No. 2, and No. 3 bundles are made $4) less maximum prices for the corresponding grade or grades of prepared scrap. In no case, however, shall electric furnace and foundry grades be used as the "corresponding grade or grades of prepared scrap." Converter may charge $2.50 per ton on consumer-owned unprepared remote scrap (see order) A preparation-in-transit charge for allocated unprepared scrap is provided.

NEW LISTED GRADES: Priced in dollars per gross ton less than No. 1 heavy melting steel. Pit scrap, ladle skulls, slag reclaim, etc., of 85% or more Fe priced—$2; 75 to 85% Fe—$4; under 75% Fe—$8 per ton. Mill scale of 65% or more Fe—$8 per ton. Mill cinder and grindings, shipping point maximum price of $4 per gross ton at all U. S. shipping points.

CHEMICAL BORINGS: No. 1 (new, clean, containing not more than 1 per cent oil), $1 less than No. 1 heavy melting; No. 2 (new, clean, containing not more than 1.5 per cent oil), $2 less than No. 1 heavy melting. If loaded in box cars add 75c.

*At Memphis 50c.; Great Lakes ports $1; New England $1.25

RAILROAD SCRAP

	No. 1 RR Heavy Melting	Scrap Rails	Rails for Rerolling	Scrap Rails: 3 ft. and Under	Scrap Rails: 2 ft. and Under	Scrap Rails: 18 in. and Under
Cleveland, Cincinnati, Ashland, Portsmouth, Middletown	$20.50	$21.50	$23.00	$23.50	$23.75	$24.00
Canton, Pittsburgh, Sharon, Steubenville, Wheeling, Youngstown	21.00	22.00	23.50	24.00	24.25	24.50
Chicago, Philadelphia, Sparrows Pt., Wilmington	19.75	20.75	22.25	22.75	23.00	23.25
Birmingham, Los Angeles, San Francisco	18.00	19.00	20.50	21.00	21.25	21.50
Buffalo	20.25	21.25	22.75	23.25	23.50	23.75
Detroit	18.85	19.85	21.35	21.85	22.10	22.35
Duluth	19.00	20.00	21.50	22.00	22.25	22.50
Kansas City, Mo.	17.00	18.00	19.50	20.00	20.25	20.50
Kokomo, Ind.	19.25	20.25	21.75	22.25	22.50	22.75
Seattle	15.50	16.50	18.00	18.50	18.75	19.00
St. Louis	18.50	19.50	21.00	21.50	21.75	22.00

CAST IRON SCRAP

	Group A	Group B	Group C
No. 1 cupola cast	$18.00	$19.00	$20.00
Clean auto cast	18.00	19.00	20.00
Unstripped motor blocks	16.50	16.50	17.50
Stove Plate	17.00	18.00	19.00
Heavy Breakable Cast	15.50	16.50	17.50
Charging Box Size Cast	17.00	18.00	19.00
Misc. Malleable	20.00	21.00	22.00

Group A includes the states of Montana, Idaho, Wyoming, Nevada, Utah, Arizona and New Mexico.

Group B includes the states of North Dakota, South Dakota, Nebraska, Colorado, Kansas, Oklahoma, Texas and Florida.

Group C: States not named in A and B; switching district of Kansas City, Kan., Mo.

Tool Steel Scrap Ceiling Prices Set by MPR 379, May 4, 1943

BASE PRICE SEGREGATED

	Solids, Lb. Cont. W	Turnings, Lb. Cont. W
Type 1	$1.80	$1.60
Type 2	1.60	1.40
Type 3	1.25	1.25
Type 4*	0.125	0.105
Type 5*	0.135	0.115

*Per lb. of scrap materia.

BASE PRICE UNSEGREGATED SOLIDS

$1.50 per lb. contained W if 5% or more.

$1.15 per lb. contained W if over 1% and less than 5%.

$0.80 per lb. contained Mo if 1½% or more.

BASE PRICE UNSEGREGATED TURNINGS

$1.30 per lb. contained W if 5% or more.

$1.00 per lb. contained W if 1% and less than 5%.

$0.70 per lb. contained Mo if 1½% or more.

Comparison of Prices . . .

Advances Over Past Week in **Heavy Type**; Declines in *Italics*. [Prices Are F.O.B. Major Basing Points]

Flat Rolled Steel: (Cents Per Lb.)	Nov. 23, 1943	Nov. 16, 1943	Oct. 26, 1943	Nov. 24, 1942
Hot rolled sheets	2.10	2.10	2.10	2.10
Cold rolled sheets	3.05	3.05	3.05	3.05
Galvanized sheets (24 ga.)	3.50	3.50	3.50	3.50
Hot rolled strip	2.10	2.10	2.10	2.10
Cold rolled strip	2.80	2.80	2.80	2.80
Plates	2.10	2.10	2.10	2.10
Plates, wrought iron	3.80	3.80	3.80	3.80
Stain's c.r. strip (No. 302)	28.00	28.00	28.00	28.00
Tin and Terne Plate: (Dollars Per Base Box)				
Tin plate, standard cokes	$5.00	$5.00	$5.00	$5.00
Tin plate, electrolytic	4.50	4.50	4.50	4.50
Special coated mfg. ternes	4.30	4.30	4.30	4.30
Bars and Shapes: (Cents Per Lb.)				
Merchant bars	2.15	2.15	2.15	2.15
Cold finished bars	2.65	2.65	2.65	2.65
Alloy bars	2.70	2.70	2.70	2.70
Structural shapes	2.10	2.10	2.10	2.10
Stainless bars (No. 302)	24.00	24.00	24.00	24.00
Wrought iron bars	4.40	4.40	4.40	4.40
Wire and Wire Products: (Cents Per Lb.)				
Plain wire	2.60	2.60	2.60	2.60
Wire nails	2.55	2.55	2.55	2.55
Rails: (Dollars Per Gross Ton)				
Heavy rails	$40.00	$40.00	$40.00	$40.00
Light rails	40.00	40.00	40.00	40.00
Semi-Finished Steel: (Dollars Per Gross Ton)				
Rerolling billets	$34.00	$34.00	$34.00	$34.00
Sheet bars	34.00	34.00	34.00	34.00
Slabs	34.00	34.00	34.00	34.00
Forging billets	40.00	40.00	40.00	40.00
Alloy blooms, billets, slabs	54.00	54.00	54.00	54.00
Wire Rods and Skelp: (Cents Per Lb.)				
Wire rods	2.00	2.00	2.00	2.00
Skelp (grvd)	1.90	1.90	1.90	1.90

Pig Iron: (Per Gross Ton)	Nov. 23, 1943	Nov. 16, 1943	Oct. 26, 1943	Nov. 24, 1942
No. 2 fdy., Philadelphia	$25.84	$25.84	$25.89	$25.89
No. 2, Valley furnace	24.00	24.00	24.00	24.00
No. 2, Southern Cin'ti	24.68	24.68	24.68	24.68
No. 2, Birmingham	20.38	20.38	20.38	20.38
No. 2, foundry, Chicago†	24.00	24.00	24.00	24.00
Basic, del'd eastern Pa.	25.39	25.39	25.39	25.39
Basic, Valley furnace	23.50	23.50	23.50	23.50
Malleable, Chicago†	24.00	24.00	24.00	24.00
Malleable, Valley	24.00	24.00	24.00	24.00
L. S. charcoal, Chicago	31.34	31.34	31.34	31.34
Ferromanganese‡	135.00	135.00	135.00	135.00

†The switching charge for delivery to foundries in the Chicago district is 60c. per ton.
‡For carlots at seaboard.

Scrap: (Per Gross Ton)				
Heavy melt'g steel, P'gh.	$20.00	$20.00	$20.00	$20.00
Heavy melt'g steel, Phila.	18.75	18.75	18.75	18.75
Heavy melt'g steel, Ch'go	18.75	18.75	18.75	18.75
No. 1 hy. comp. sheet, Det.	17.85	17.85	17.85	17.85
Low phos. plate, Youngs'n	22.50	22.50	22.50	22.50
No. 1 cast, Pittsburgh	20.00	20.00	20.00	20.00
No. 1 cast, Philadelphia	20.00	20.00	20.00	20.00
No. 1 cast, Ch'go	20.00	20.00	20.00	20.00
Coke, Connellsville: (Per Net Ton at Oven)				
Furnace coke, prompt	$6.50	$6.50	$6.50	$6.00
Foundry coke, prompt	7.50	7.375	6.875	6.875
Non-Ferrous Metals: (Cents per Lb. to Large Buyers)				
Copper, electro., Conn.	12.00	12.00	12.00	12.00
Copper, Lake, New York	12.00	12.00	12.00	12.00
Tin (Straits), New York	52.00	52.00	52.00	52.00
Zinc, East St. Louis	8.25	8.25	8.25	8.25
Lead, St. Louis	6.35	6.35	6.35	6.35
Aluminum, Virgin, del'd.	15.00	15.00	15.00	15.00
Nickel, electrolytic	35.00	35.00	35.00	35.00
Magnesium, ingot	20.50	20.50	20.50	22.50
Antimony (Asiatic), N. Y.	16.50	16.50	16.50	16.50

The various basing points for finished and semi-finished steel are listed in the detailed price tables, pages 131-145.

Composite Prices . . .

	FINISHED STEEL	PIG IRON	SCRAP STEEL
Nov. 23, 1943	2.25513c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One week ago	2.25513c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One month ago	2.25513c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One year ago	2.26190c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton

	FINISHED STEEL HIGH	FINISHED STEEL LOW	PIG IRON HIGH	PIG IRON LOW	SCRAP STEEL HIGH	SCRAP STEEL LOW
1943	2.25513c.,	2.25513c.,	$23.61	$23.61	$19.17	$19.17
1942	2.26190c.,	2.26190c.,	23.61	23.61	19.17	19.17
1941	2.43078c.,	2.43078c.,	$23.61, Mar. 20	$23.45, Jan. 2	$22.00, Jan. 7	$19.17, Apr. 10
1940	2.30467c., Jan. 2	2.24107c., Apr. 16	23.45, Dec. 23	22.61, Jan. 2	21.83, Dec. 30	16.04, Apr. 9
1939	2.35367c., Jan. 3	2.26689c., May 16	22.61, Sept. 19	20.61, Sept. 12	22.50, Oct. 3	14.08, May 16
1938	2.58414c., Jan. 4	2.27207c., Oct. 18	23.25, June 21	19.61, July 6	15.00, Nov. 22	11.00, June 7
1937	2.58414c., Mar. 9	2.32263c., Jan. 4	23.25, Mar. 9	20.25, Feb. 16	21.92, Mar. 30	12.67, June 9
1936	2.32263c., Dec. 28	2.05200c., Mar. 10	19.74, Nov. 24	18.73, Aug. 11	17.75, Dec. 21	12.67, June 9
1935	2.07642c., Oct. 1	2.06492c., Jan. 8	18.84, Nov. 5	17.83, May 14	13.42, Dec. 10	10.33, Apr. 29
1934	2.15367c., Apr. 24	1.95757c., Jan. 2	17.90, May 1	16.90, Jan. 27	13.00, Mar. 13	9.50, Sept. 25
1933	1.95578c., Oct. 3	1.75836c., May 2	16.90, Dec. 5	13.56, Jan. 3	12.25, Aug. 8	6.75, Jan. 3
1932	1.89196c., July 5	1.83901c., Mar. 1	14.81, Jan. 5	13.56, Dec. 6	8.50, Jan. 12	6.43, July 5
1931	1.99626c., Jan. 13	1.86586c., Dec. 29	15.90, Jan. 6	14.79, Dec. 15	11.33, Jan. 6	8.50, Dec. 29
1930	2.25488c., Jan. 7	1.97319c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929	2.31773c., May 28	2.26498c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3

Weighted index based on steel bars, beams, tank plates, wire, rails, black pipe, hot and cold-rolled sheets and strip, representing 78 per cent of the United States output. Index recapitulated in Aug. 28, 1941, issue.

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

Information Free

(1) Stock List & Reference Book:

Complete with list and description of steels, machinery, tools and specialties carried in stock. Valuable to steel users for its reference material. *United States Steel Supply Co.*

(2) Track Supplies:

Condensed catalog presents all the major track accessories required for industrial plant haulage systems. A guide and timesaver in the selection of track accessories. *L. B. Foster Co.*

(3) Drilling Calculator:

A slide-rule drilling calculator printed on durable varnished stock enables the quick determination of the correct feeds and speeds for drilling various types of metals with drills of various diameters. *The Fosdick Machine Tool Co.*

(4) Cutting Oils:

Booklet describes Toolife cutting oils which have germicidal qualities for the prevention of dermatitis. *Specialty Products Co., Inc.*

(5) D. C. Generator:

The amplidyne is the subject of an attractive new 36-page bulletin GEA-4053. Profusely illustrated, "The Short Cut that Moves Mountains" describes the engineering details and fundamental functions of the amplidyne, which is an externally driven d.c. generator which uniquely uses a short circuit and a compensating winding. Shows operating principles, fundamental functions and typical applications. *General Electric Co.*

(6) Hand Tachometers:

Folder deals with triple gear and single range hand tachometers, which are used by various branches of the Government, on electric locomotives, diesel electric trains and in many differing lines of industry. The tachometers are of the centrifugal, mechanical type, requiring neither stop watch nor calculation. *Coats Machine Tool Co., Inc.*

(7) High Speed Cutting:

Folder describes how cut-off operations may be speeded up by use of high speed metal cutting machine. Illustrates how machine may be equipped with an abrasive wheel, with a saw blade and with a flat work table without V-blocks. *DeWalt Products Corp.*

(8) Steam Atomizing Oil Burners:

16-page Bulletin No. 21 refers to Type SA oil burners for use with either steam or compressed air for atomizing the oil. Shows furnace design and construction and gives complete list of auxiliary equipment. *National Airoil Burner Co., Inc.*

(9) Engineering Data Book:

"Turret Tool Lathes" contains descriptions and specifications of all the tools that are made for placing on the Foster Fastermatic turret type and the platen type automatic lathes. It contains engineering drawings throughout and illustrates all the basic and fundamental tool dimensions that are necessary for set-up men, master mechanics, time estimators and tool engineers. *International Machine Tool Corp., Foster Div.*

(10) Convection Heated Ovens:

"Blueprint for Industry" is the name of an unusual 18-page booklet of engineering information on high-production convection heated ovens for batch and continuous heating processes used in armament production. It is illustrated entirely by reproductions of blueprints showing typical installations of oven and materials handling equipment. Part II of a series. *Industrial Oven Engineering Co.*

(11) High Speed Steel:

Booklet discusses forging, annealing, hardening, quenching and tempering of Mustang high speed steel. Lists various applications and gives typical analysis as well as recommendations for use. *Jessop Steel Co.*

(12) Metal Turnings Crusher:

Pamphlet covers design, construction and features of ring turning crushers, which utilize the rolling ring principle of crushing and incorporate patented shredder rings and automatic apron. Installations in various plants illustrated. *American Pulverizer Co.*

(13) Treating of Steel Bars:

32-page Bulletin No. 1 is entitled "Helpful Data on Cold Finished and Furnace Treated Steel Bars," and is a non-technical story of steel making from ore to the cold finished steel bar. *LaSalle Steel Co.*

(14) Standard, Special Gages:

Attractive folder contains four separate booklets, the first of which discusses the experimental engineering, research and development service; the second, the standard gage department manufacturing plain and threaded plug and ring gages; the third, the tool division devoted to the design and production of special gages, jigs and fixtures; and the fourth, the machine shop for the manufacture of special parts. *Merz Engineering Co.*

(15) Abrasive Specialty Items:

Written for the manufacturer with a finishing problem, "3-M Abrasive Specialty Items" shows the types of abrasive shapes and forms that have been devised for grinding and finishing metal. Items include belts, Evenrun bands, cones, sleeves, cartridge rolls, overlap slotted disks, and slotted and pyramid discs. *Minnesota Mining & Mfg. Co.*

(16) Compressor Calculator:

Designed to aid in computing compressor requirements or in estimating performance of compressor units, a pocket-size compressor calculator can be used for estimating the volumetric efficiency, brake h.p. and total piston displacement of any make of compressor. *The Cooper-Bessemer Corp.*

(17) Grainal Alloys:

Bulletin of general information on a series of intensifying alloys refers to the uses and applications of Grainal Nos. 1, 6 and 79. Tells what Grainal alloys do and are, which to select for specific purposes, how they are added, and advantages gained by their use. *Vanadium Corp. of America.*

(18) Valve and Hose Couplings:

Folder describes "Quick-As-Wink" valve couplings, and hose couplings, nipples and clamps. Gives parts list and dimensions for valve couplings and for standard shank type couplings, nipples and clamps. *C. B. Hunt & Son.*

(19) Tap Grinders:

8-page folder describes tap grinder which sharpens the chamfer on right or left-hand taps with 2, 3, 4, 5, 6, 8 or 10 flutes. Illustrates front and rear view of machine showing principal operating points. *Edward Blake Co.*

NOTICE TO READERS: Your request for this information will be forwarded promptly to the manufacturer issuing the literature, and the offer is good for only two months.

11/25/43

THE IRON AGE, New York 17, N. Y.

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(20) Electronic Inspection Tool:

Two folders are descriptive of the Norelco Searchray Model 80, which is a simple compact X-ray unit for safe, rapid inspection of small parts, assemblies, molds and castings of light alloys, ceramics, plastics, rubber and similar products. *North American Philips Co., Inc.*

(21) Grinding Wheels:

Bulletin entitled "Facts About Bay State Koolpore Grinding Wheels" describes the line of abrasive products, together with tool and cutter recommendations and surfacing recommendations. *Bay State Abrasive Products Co.*

(22) Heat-Resistant Molding Powder:

10-page booklet is concerned with another example of how DuPont technicians are helping the molding industry to produce better molded pieces more quickly at less cost, and how they are helping to supply actual users with improved materials to meet their broadening requirements. *E. I. DuPont de Nemours & Co. (Inc.), Plastics Dept.*

(23) Wrench Catalog:

Catalog No. 243 is a wartime buyer's reference on socket, box-type and open-end wrenches, torque indicators and wrench assortments. Included is a dictionary of wrench terms and suggested substitutions for items no longer available. *Blackhawk Mfg. Co.*

(24) Steel Valves:

Entitled "The Best Move," pamphlet describes the line of stop, check, non-return, blow-off and Intex valves and lists thirteen unique design features which cut operating interruptions and lengthen useful valve life. *The Edward Valve & Mfg. Co., Inc.*

(25) Instruction Booklet:

Booklet of interest only to people using the Model 1201 series of dial indicator hole gages. Goes into such details as how to set and handle the instrument and miscellaneous details having to do with the proper handling and application of a highly sensitive dial indicator type of gage. *Federal Products Corp.*

(26) Silver Babbitt:

Folder sets forth how American ingenuity scores again by replacing tin base babbitts with silver babbitts. Offers engineering recommendations to improve bearing performance. *National Bearing Metals Corp.*

(27) Lubricating Systems:

Bulletin No. 671 explains how greater output per man per machine with less waste of critical material and power may be obtained by use of Centro-Matic systems, which automatically supply lubricant to every bearing. *Lincoln Engineering Co.*

(28) Masonry Saw:

Folder gives details of pressure equalizer, teeter-proof conveyor cart, adjustable head and lock pin adjustment features of masonry saw, which utilizes a series of rapid cuts that automatically discharge cuttings and eliminate frictional heat. *The Clipper Mfg. Co.*

(29) Steel Joists:

36-page booklet is divided into six sections, dealing with steel joist construction, standards, design tables, construction accessories, design elements and specifications. *Laclede Steel Co.*

(30) Carbide Tool Prices:

Bulletin No. 143 is latest price list of grades and classifications of metals and of standard cutting tools and blanks, solid tungsten carbide for boring tools and tungsten carbide center inserts. *Willey's Carbide Tool Co.*

(31) Precision Gages:

36-page catalog shows not only prices of standard precision gages and carbide tipped tools, but also presents engineering data helpful in selecting the proper tool or gage for a specific purpose. *Metro Tool & Gage Co.*

(32) N. E. Steels:

Booklet discusses properties, treatment and application of National Emergency steels. Included is data showing NE steel test results compared with SAE and AISI results and combined standard steel lists of AISI and SAE of open hearth alloy and electric furnace alloy steels. *Republic Steel Corp.*

(33) Conveyors:

Folder illustrates belt conveyors, conveyor idlers, training idlers, trippers, pulleys, stackers, crushers, skip hoists, pivoted bucket conveyors, grab buckets, loading towers, ore bedding and reclaiming systems, car dumpers, foundry shakeouts, liquid and vibrating screens. *Robins Conveyors, Inc.*

(34) Metal Cleaning and Finishing:

Problems involved in cleaning and finishing metal parts are discussed in 32-page manual. Information is given on types of cleaning machines, methods and materials. *Howard Engineering & Mfg. Co.*

(35) Tool Catalog:

Catalog No. 227 features Tantung, a non-ferrous cast alloy for metal cutting developed to fill the gap between conventional high-speed steel tools and cemented carbides. Describes how to grind and braze Tantung, along with performance data showing results obtained in various machining operations. *Vasco-loy-Ramet Corp.*

(36) Emulsion Cleaners:

4-page bulletin describes emulsion cleaners for rapid cleaning of all types of basis metals without attack and for cleaning badly contaminated work. *The Ethone Co.*

(37) Pump Data Sheets:

Portfolio of pump data sheets containing facts and pointers on efficient pumping. Folders include: "Pump Trouble Check Sheet"; "Priming Methods"; "Hydraulic Data"; "New Pump vs. Old Pump"; "Boiler Feeding & Hot Water"; "Centrifugal Boiler Feed Pumps"; and "Pump Fundamentals." *Gould Pumps, Inc.*

(38) Precision Equipment:

Catalog No. 836 is descriptive of surface and layout plates, reading and checking tables, work benches, bench plates, lapping plates and bench stands. Also illustrates abrasive cut-off machine which cuts hard or soft metals. *The Challenge Machinery Co.*

(39) Heat Treating Atmospheres:

Booklet No. B-3251 describes the composition of the four basic Westinghouse atmospheres, how they are obtained and the apparatus needed to produce them. Table gives proper atmosphere for various treatments of specific metals. *Westinghouse Electric & Mfg. Co.*

(40) Level Control:

28-page catalog No. 943 features all-electric floatless liquid level control. In addition to describing the primary equipment such as electrodes, relays, etc., there are included special controls and panels, a.c. automatic starter and relay combinations, selector switches, special relays, water-proof enclosures, wiring diagrams, etc. *B/W Controller Corp.*

(41) Chip Wringers:

Bulletin features the advantages of centrifugal chip wringers which are made in five sizes from 14 to 48 in. bowl. Rapid acceleration, quick stopping, and easy loading and unloading are some of the advantages. Self-dumping hook enables operator to dump the dry chips with practically no effort. *Fletcher Works.*

(42) Steam, Water Equipment:

Improvements in the method of admitting steam, compressed air, and fluids to rotating chambers are described in bulletin on rotary pressure joints. Other bulletins in this collection include electraps and valve traps for boiler feed service, air and steam separation devices, automatic boiler water controls, and steam operated water heaters. *The Johnson Corp.*

11/25/43

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. . . Prices of Finished Iron and Steel—

Steel prices shown here are f.o.b. basing points, in cents per lb., unless otherwise indicated. On some products either quantity deductions or quantity extras apply. In many cases gage, width, mutting, physical, chemical extras, etc., apply to the base price. Actual realized prices to the mill, therefore, are affected by extras, reductions, and in most cases freight absorbed to meet competition. Delivered prices do not reflect new 3 per cent tax on freight rates.

Basing Point → / Product ↓	Pittsburgh	Chicago	Gary	Cleveland	Birmingham	Buffalo	Youngstown	Sparrows Point	Granite City	Middletown, Ohio	Gulf Ports, Cars	Pacific Ports, Cars[10]	DELIVERED TO Detroit	New York	Philadelphia
SHEETS															
Hot rolled	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.20¢	2.10¢		2.65¢	2.20¢	2.34¢	2.27¢
Cold rolled[1]	3.05¢	3.05¢	3.05¢	3.05¢		3.05¢	3.05¢		3.15¢	3.05¢		3.70¢	3.15¢	3.39¢	3.37¢
Galvanized (24 ga.)	3.50¢	3.50¢	3.50¢		3.50¢	3.50¢	3.50¢	3.50¢	3.60¢	3.50¢		4.05¢		3.74¢	3.67¢
Enameling (20 ga.)	3.35¢	3.35¢	3.35¢	3.35¢			3.35¢		3.45¢	3.35¢		4.00¢	3.45¢	3.71¢	3.67¢
Long ternes[2]	3.80¢		3.80¢									4.55¢		4.16¢	4.12¢
STRIP															
Hot rolled[3]	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢			2.10¢		2.75¢	2.20¢	2.46¢	
Cold rolled[4]	2.80¢	2.90¢		2.80¢			2.80¢	(Worcester—3.00¢)					2.90¢	3.16¢	
Cooperage stock	2.20¢	2.20¢			2.20¢		2.20¢							2.56¢	
Commodity C-R	2.95¢	3.05¢		2.95¢			2.95¢	(Worcester—3.35¢)					3.05¢	3.31¢	
TIN MILL PRODUCTS															
Coke tin plate, base box	$5.00	$5.00	$5.00						$5.10					5.36¢	5.32¢
.50 Electro tin plate, box	$4.50	$4.50	$4.50												
.75 Electro tin plate, box	$4.65		$4.65												
Black plate, 29 gage[5]	3.05¢	3.05¢	3.05¢						3.15¢			4.05¢[12]			3.37¢
Mfg. ternes, special box	$4.30	$4.30	$4.30						$4.40						
BARS															
Carbon steel	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢		(Duluth—2.25¢)			2.50¢	2.80¢	2.25¢	2.49¢	2.47¢
Rail steel[6]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢					2.50¢	2.80¢			
Reinforcing (billet)[7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢			2.50¢	2.55¢[13]	2.25¢	2.39¢	
Reinforcing (rail)[7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢				2.50¢	2.55¢[13]	2.25¢		2.47¢
Cold finished[8]	2.65¢	2.65¢	2.65¢	2.65¢		2.65¢			(Detroit—2.70¢)					2.99¢	2.97¢
Alloy, hot rolled	2.70¢	2.70¢				2.70¢	(Bethlehem, Massillon, Canton—2.70¢)						2.80¢		
Alloy, cold drawn	3.35¢	3.35¢	3.35¢	3.35¢		3.35¢							3.45¢		
PLATES								(Coatesville and Claymont—2.10¢)							
Carbon steel	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢	2.35¢		2.45¢	2.65¢	2.32¢	2.29¢	2.15¢
Floor plates	3.35¢	3.35¢									3.70¢	4.00¢		3.71¢	3.67¢
Alloy	3.50¢	3.50¢			(Coatesville—3.50¢)						3.95¢	4.15¢		3.70¢	3.59¢
SHAPES															
Structural	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢	(Bethlehem—2.10¢)				2.45¢	2.75¢		2.27¢	2.215¢
SPRING STEEL, C-R															
0.26 to 0.50 Carbon	2.80¢			2.80¢			(Worcester—3.00¢)								
0.51 to 0.75 Carbon	4.30¢			4.30¢			(Worcester—4.50¢)								
0.76 to 1.00 Carbon	6.15¢			6.15¢			(Worcester—6.35¢)								
1.01 to 1.25 Carbon	8.35¢			8.35¢			(Worcester—8.55¢)								
WIRE[9]															
Bright[14]	2.60¢	2.60¢		2.60¢	2.60¢		(Worcester—2.70¢)					3.10¢			2.92¢
Galvanized	add proper size extra and galvanized extra to bright wire base, above.														
Spring (High Carbon)	3.20¢	3.20¢		3.20¢			(Worcester—3.30¢)					3.70¢			3.52¢
PILING															
Steel sheet	2.40¢	2.40¢				2.40¢						2.95¢			2.72¢

[1] Mill run sheets are 10c per 100 lb. less than base; and primes only, 25c. above base. [2] Unassorted 8-lb. coating. [3] Widths up to 12 in. [4] Carbon 0.25 per cent and less. [5] Applies to certain width and length limitations. [6] For merchant trade. [7] Prices for straight length material only, from a producer to a consumer. Functional discount of 25c. per 100 lb. to fabricators. [8] Also shafting. For quantities of 20,000 to 29,999 lb. [9] Carload lot to manufacturing trade. [10] These prices do not apply if the customary means of transportation (rail and water) are not used. [12] Boxed. [13] Portland and Seattle price, San Francisco price is 2.50c. [14] This bright wire base price to be used in figuring annealed and bright finish wires, commercial spring wire and galvanized wire.

GOVERNMENT CEILING—Price Schedule No. 6 issued April 16, 1941, governs steel mill prices; Price Schedule No. 49 governs warehouse prices which are on another page of this issue.

EXCEPTIONS TO PRICE SCHEDULE No. 6—On hot rolled carbon bars, Phoenix Iron Co. may quote 2.35c. at established basing points, Calumet Steel division of Borg Warner may quote 2.35c., Chicago, on bars from its 8-in. mill; Joslyn Mfg. Co. may quote 2.35c., Chicago base. On rail steel bars Sweets Steel Co. may quote 2.35c., f.o.b. mill. On hot rolled sheets, Andrews Steel Co. may quote for shipment to Detroit area on Middletown base; Parkersburg Iron & Steel may quote $2.25 per hundred f.o.b. Parkersburg, W. Va. On galvanized sheets, Andrews Steel may quote 3.75c., at established basing points; Parkersburg Iron & Steel may quote $3.85 per hundred f.o.b. Parkersburg, W. Va. On hot rolled strip, Joslyn Mfg. Co. may quote 2.30c., Chicago base. On plates, Granite City Steel Co. may quote 2.35c., f.o.b. mill, and Central Iron & Steel Co. may quote 2.20c., f.o.b. basing points. On shapes, Phoenix Iron Co. may quote 2.30c. established basing points and 2.50c. Phoenixville for export.

On rail steel merchant bars, Eckels-Nye Corp. may charge 2.40c. On tubing, South Chester Tube Co. may price Gulf or Pacific Coast all-rail shipments and shipments west of Harrisburg on basis of f.o.b. Chester. On lend-lease sales to eastern seaboard, Sheffield Steel Co. and Colorado Fuel & Iron Corp. may sell f.o.b. mill. SEMIFINISHED STEEL—Follansbee Steel Corp. may sell forging billets at $40.50 f.o.b. Toronto; Continental Steel Corp. may sell Acme Steel Co. at $34 for rerolling billets plus extras and freight; Ford Motor Co. may sell rerolling billets at $34 f.o.b. Dearborn; Andrews Steel Co. may sell forging billets at $50 at established basing points and slabs at $41; Empire Sheet and Tin Plate may sell slabs at $41 at established basing points and sheet bars at $39 f.o.b. mill; on lend-lease sales Northwestern Steel & Wire Co. may charge $41 per gross ton f.o.b. mill for rerolling billets; on lend-lease sales Wheeling Steel Corp. may charge $36 per ton for small billets, f.o.b. Portsmouth and $37 per ton for sheet bars f.o.b. Portsmouth; Laclede Steel Co. on semi-finished sales for lend-lease shipped to eastern seaboard may use Chicago basing point prices f.o.b. Alton and Madison, Ill. ALLOY STEEL BARS—Texas Steel Co. may use Chicago base f.o.b. Fort Worth.

WAREHOUSE PRICES

Delivered metropolitan areas per 100 lb. These are zoned warehouse prices in conformance with latest zoning amendments to OPA Price Schedule 49.

Cities	SHEETS			STRIP		Plates ¼ in. and heavier	Structural Shapes	BARS		ALLOY BARS			
	Hot Rolled (10 gage)	Cold Rolled	Galvanized (24 gage)	Hot Rolled	Cold Rolled			Hot Rolled	Cold Finished	Hot Rolled, NE 8617-20	Hot Rolled, NE 9442-45 Ann.	Cold Drawn, NE 8617-20	Cold Drawn, NE 9442-45 Ann.
Philadelphia	$3.518	$4.872[6]	$5.018a	$3.922	$4.772	$3.605	$3.666	$3.882	$4.072	....	$7.116	....	....
New York	3.590	4.613[3]	5.010	3.974[6]	4.774	3.768	3.758	3.853	4.103	$6.008	7.158	$7.303	$8.453
Boston	3.774	4.744[9]	5.224[9]	4.106	4.715	3.912	3.912	4.044	4.144	6.162	7.312	7.344	8.494
Baltimore	3.394	4.852	4.894	3.902	4.752	3.594	3.759	3.802	4.052	....	....	....	....
Norfolk	3.771	4.965	5.371	4.165	4.865	3.971	4.002	4.065	4.165	....	....	....	....
Washington	3.596	4.841	5.196[4]	4.041	4.741	3.796	3.930	3.941	4.041	....	....	....	....
Chicago	3.25	4.20	5.23	3.60	4.65[17]	3.55	3.55	3.50	3.75	5.75	6.90	8.85	8.00
Milwaukee	3.387	4.337[3]	5.272[4]	3.737	4.787[17]	3.687	3.687	3.637	3.887	5.987	7.137	7.087	8.237
Cleveland	3.35	4.40	4.877[4]	3.60	4.45	3.40	3.588	3.35	3.75	5.956	7.106	6.85	8.00
Buffalo	3.35	4.40	4.75[4]	3.819	4.669	3.63	3.40	3.35	3.75	5.75	6.90	6.85	8.00
Detroit	3.45	4.50	5.00[4]	3.70	5.909[17]	3.609	3.661	3.45	3.80	6.08	7.23	7.159	8.309
Cincinnati	3.425	4.475[3]	4.825[5]	3.675	4.711	3.611	3.691	3.611	4.011	....	....	....	....
St. Louis	3.397	4.247[3]	5.172[4]	3.747	4.931[17]	3.697	3.697	3.647	4.031	6.131	7.281	7.231	8.381
Pittsburgh	3.35	4.40	4.75	3.60	4.45	3.40	3.40	3.35	3.75	5.75	7.15	6.85	8.25
St. Paul	3.51	4.46	5.257[4]	3.86	4.35[17]	3.81[13]	3.81[13]	3.76[13]	4.361	6.09	7.24	7.561	8.711
Omaha	3.865	5.443	5.608[4]	4.215	....	4.165	4.165	4.115	4.443	....	....	....	....
Indianapolis	3.58	3.58	4.568	4.918	3.768	4.78	3.63	3.58	3.98	6.08	7.23	7.18	8.33
Birmingham	3.45	....	4.75	3.70	....	3.55	3.55	3.50	4.43	....	....	....	....
Memphis	3.85[7]	4.66	5.25	4.10	....	3.95	3.95	3.90	4.31	....	....	....	....
New Orleans	3.95	4.95	5.25	4.20	....	3.90	3.90	4.10	4.60	....	....	....	....
Houston	3.763	5.573[3]	6.313[1]	4.313	....	4.25	4.25	3.75	6.373[3]	7.223	8.323	8.323	9.373
Los Angeles	5.00	7.20[3]	6.10[4]	4.95	5.613[15]	4.95	4.65	4.40	5.583	8.304	9.404	9.404	10.454
San Francisco	4.55[14]	7.30[4]	6.35[4]	4.50[14]	7.333[17]	4.65[14]	4.35[14]	4.15[14]	5.333	8.304	9.404	9.404	10.454
Seattle	....	....	....	....	....	....	....	....	....	....	....	....	....
Portland	4.65[11]	6.60[4]	5.75[4]	4.75[11]	....	4.75[11]	4.45[11]	4.45[11]	5.533	8.304	9.404	8.304	9.404
Salt Lake City	4.53[17]	....	6.17[18]	5.53[17]	....	4.98[17]	4.98[17]	4.88[17]	5.90	....	....	....	....

NATIONAL EMERGENCY (NE) STEELS

(Hot Rolled Mill Extras for Alloy Content)

Designation	CHEMICAL COMPOSITION LIMITS, PER CENT								Basic Open-Hearth		Electric Furnace	
	Carbon	Manganese	Phosphorus Max.	Sulphur Max.	Silicon	Chromium	Nickel	Molybdenum	Bars and Bar Strip	Billets, Blooms and Slabs	Bars and Bar Strip	Billets, Blooms and Slabs
NE 1330	.28/ .33	1.60/1.90	.040	.040	.20/ .35	.....	.....	.....	.10c	$2.00	.....	.....
NE 1335	.33/ .38	1.60/1.90	.040	.040	.20/ .35	.....	.....	.....	.10	2.00	.....	.....
NE 1340	.38/ .43	1.60/1.90	.040	.040	.20/ .35	.....	.....	.....	.10	2.00	.....	.....
NE 1345	.43/ .48	1.60/1.90	.040	.040	.20/ .35	.....	.....	.....	.10	2.00	.....	.....
NE 1350	.48/ .53	1.60/1.90	.040	.040	.20/ .35	.....	.....	.....	.10	2.00	.....	.....
NE 8613	.12/ .17	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8615	.13/ .18	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8617	.15/ .20	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8620	.18/ .23	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8630	.28/ .33	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8635	.33/ .38	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8637	.35/ .40	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8640	.38/ .43	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8642	.40/ .45	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8645	.43/ .48	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8650	.48/ .53	.75/1.00	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8720	.18/ .23	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.20/ .30	.80	16.00	1.30	26.00
NE 9255	.50/ .60	.70/ .95	.040	.040	1.80/2.20	.....	.....	.....	.40	8.00	.....	.....
NE 9260	.55/ .65	.70/1.00	.040	.040	1.80/2.20	.....	.....	.....	.40	8.00	.....	.....
NE 9261	.55/ .65	.70/1.00	.040	.040	1.80/2.20	.10/ .25	.....	.....	.65	13.00	.....	.....
NE 9262	.55/ .65	.70/1.00	.040	.040	1.80/2.20	.25/ .40	.....	.....	.65	13.00	.....	.....
NE 9415	.13/ .18	.80/1.10	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	$25.00
NE 9420	.18/ .23	.80/1.10	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9422	.20/ .25	.80/1.10	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9425	.23/ .28	.80/1.10	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9430	.28/ .33	.90/1.20	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9435	.33/ .38	.90/1.20	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9437	.35/ .40	.90/1.20	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9440	.38/ .43	.90/1.20	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.75	15.00	1.25	25.00
NE 9442	.40/ .45	1.00/1.30	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.80	16.00	1.30	26.00
NE 9445	.43/ .48	1.00/1.30	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.80	16.00	1.30	26.00
NE 9450	.48/ .53	1.20/1.50	.040	.040	.20/ .35	.30/ .50	.30/ .60	.08/ .15	.80	16.00	1.30	26.00
NE 9537*	.35/ .40	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00
NE 9540*	.38/ .43	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00
NE 9542*	.40/ .45	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00
NE 9545*	.43/ .48	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00
NE 9550*	.48/ .53	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00

BASE QUANTITIES

Standard unless otherwise keyed on prices.

HOT ROLLED: Sheets, strip, plates, shapes and bars, 400 to 1999 lb.

COLD ROLLED: Sheets, 400 to 1999 lb.; strip, extras on all quantities; bars, 1500 to 39,999 lb.; NE alloy bars, 1000 to 39,999 lb.

EXCEPTIONS: (1) 150 to 499 lb. (2) 150 to 1499 lb. (3) 400 to 1499 lb. (4) 450 to 1499 lb. (5) 500 to 1499 lb. (6) 0 to 1999 lb. (7) 400 to 1999 lb. (8) 1000 to 1999 lb. (9) 450 to 3749 lb. (10) 400 to 3999 lb. (11) 300 to 4999 lb. (12) 300 to 10,000 lb. (13) 400 to 14,999 lb. (14) 400 to 39,999 lb. (15) 1000 to 39,999 lb. (16) 1500 to 39,999 lb. (17) 2000 to 39,999 lb. (18) 3500 to 39,999 lb.

(*a*) Philadelphia: Galvanized sheets, 25 or more bundles.

Extra for size, quality, etc., apply on above quotations.

***Recommended for large sections only. Note: The extras shown are in addition to a base price of 2.70c. per 100 lb., on finished products and $54 per gross ton on semi-finished steel major basing points and are in cents per 100 lb. and dollars per gross ton in semi-finished. When acid open-hearth is specified and acceptable add to basic open hearth alloy differential 0.25c. per lb. for bars and bar strip, $5.00 per gross ton for billets, blooms and slabs. The ranges shown above are restricted to sizes 100 sq. in. or less or equivalent cross sectional area 18 in. wide or under with a max. individual piece weight of 7000 lb.**

PRICES

CAST IRON WATER PIPE

	Per Net Ton
6-in. and larger, del'd Chicago	$54.80
6-in. and larger, del'd New York	52.20
6-in. and larger, Birmingham	46.00
6-in. and larger f.o.b. cars, San Francisco or Los Angeles	69.40
6-in. and larger f.o.b. cars, Seattle	71.20

Class "A" and gas pipe, $3 extra; 4-in. pipe is $3 a ton above 6-in. Prices shown are for lots of less than 200 tons. For 200 tons or over, 6-in. and larger is $45 at Birmingham and $53.80 delivered Chicago, $59.40 at San Francisco and Los Angeles, and $70.20 at Seattle. Delivered prices do not reflect new 3 per cent tax on freight rates.

LAKE SUPERIOR ORES

(51.50% *Fe, Natural Content, Delivered Lower Lake Ports**)

	Per Gross Ton
Old range, bessemer, 51.50	$4.75
Old range, non-bessemer, 51.50	4.60
Mesaba, bessemer, 51.50	4.60
Mesaba, non-bessemer, 51.50	4.45
High phosphorus, 51.50	4.35

*Adjustments are made to indicate prices based on variance of Fe content of ores as analyzed on a dry basis by independent laboratories.

COKE

Furnace

	Per Net Ton
†Connellsville, prompt	$6.50*

Foundry

†Connellsville, prompt	7.50
Fayette County, W. Va. (Beehive)	8.10
By-product, Chicago	12.25
By-product, New England	13.75
By-product, Newark	12.40 to 12.95
By-product, Philadelphia	12.38
By-product, Cleveland	12.30
By-product, Cincinnati	11.75
By-product, Birmingham	9.00†
By-product, St. Louis	12.02
By-product, Buffalo	12.50

Maximum by-product coke prices established by OPA became effective Oct. 1, 1941.

*Hand-drawn ovens using trucked coal are permitted to charge $7.00 per net ton, plus usual transportation. Maximum beehive furnace coke prices established by OPA, Feb. 8, 1942. †F.o.b. oven.

FLUORSPAR

Maximum price f.o.b. consumer's plant, $30 per short ton plus either (1) rail freight from producer to consumer, or (2) rail freight from Rosiclare, Ill., to consumer, whichever is lower.

Exception

When the WPB Steel Division certifies in writing the consumer's need for one of the higher grades of metallurgical fluorspar specified in the table below the price shall be taken from the table plus items (1 and 2) from paragraph above.

Effective CaF_2 Content:	*Base price per short ton*
70% or more	$33.00
65% but less than 70%	32.00
60% but less than 65%	31.00
Less than 60%	30.00

REFRACTORIES

(*F.o.b. Works*)

Fire Clay Brick	*Per 1000*
Super-duty brick, St. Louis	$64.60
First quality, Pa., Md., Ky., Mo., Ill.	51.30
First quality, New Jersey	56.00
Sec. quality, Pa., Md., Ky., Mo., Ill.	46.55
Second quality, New Jersey	51.00
No. 1, Ohio	43.00
Ground fire clay, net ton	7.60
Silica Brick	
Pennsylvania and Birmingham	$51.30
Chicago District	58.90
Silica cement, net ton (Eastern)	9.00
Chrome Brick	*Per Net Ton*
Standard, chemically bonded, Balt., Plymouth Meeting, Chester	$54.00
Magnesite Brick	
Standard, Balt. and Chester	$76.00
Chemically bonded, Baltimore	65.00
Grain Magnesite	
Domestic, f.o.b. Balt. and Chester in sacks (carloads)	$44.00
Domestic, f.o.b. Chewelah, Wash. (in bulk)	22.00

PRICES

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Machine and Carriage Bolts:

	Per Cent Off List
½ in. & smaller x 6 in. & shorter	65½
9/16 & ⅝ in. x 6 in. & shorter	63½
¾ to 1 in. x 6 in. & shorter	61
1⅛ in. and larger, all length	59
All diameters over 6 in. long	59
Lag, all sizes	62
Plow bolts	65

Nuts, Cold Punched or Hot Pressed:
(Hexagon or Square)

½ in. and smaller	62
9/16 to 1 in. inclusive	59
1⅛ to 1½ in. inclusive	57
1⅝ in. and larger	56

On above bolts and nuts, excepting plow bolts, additional allowance of 10 per cent for full container quantities. There is an additional 5 per cent allowance for carload shipments.

Semi-Fin. Hexagon Nuts	U.S.S.	S.A.E.
7/16 in. and smaller	..	64
½ in. and smaller	62	..
½ in. through 1 in.	..	60
9/16 to 1 in.	59	..
1⅛ in. through 1½ in.	57	58
1⅝ in. and larger	56	..

In full container lots, 10 per cent additional discount.

Stove Bolts

Packages, nuts loose	71 and 10
In packages, with nuts attached	71
In bulk	80

On stove bolts freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago, New York on lots of 200 lb. or over.

Large Rivets *(½ in. and larger)*

	Base per 100 lb.
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	$3.75

Small Rivets *(7/16 in. and smaller)*

	Per Cent Off List
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	65 and 5

Cap and Set Screws

	Per Cent Off List
Upset full fin. hexagon head cap screws, coarse or fine thread, up to and incl. 1 in. x 6 in.	64
Upset set screws, cup and oval points	71
Milled studs	46
Flat head cap screws, listed sizes	36
Filister head cap, listed sizes	51

Freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago or New York on lots of 200 lb. or over.

RAILS, TRACK SUPPLIES

(F.o.b. Mill)

Standard rails, heavier than 60 lb., No. 1 O.H., gross ton	$40.00
Angle bars, 100 lb.	2.70
(F.o.b. Basing Points)	*Per Gross Ton*
Light rails (from billets)	$40.00
Light rails (from rail steel)	39.00
	Base per Lb.
Cut spikes	3.00c.
Screw spikes	5.15c.
Tie plates, steel	2.15c.
Tie plates, Pacific Coast	2.30c.
Track bolts	4.75c.
Track bolts, heat treated, to railroads	5.00c.
Track bolts, jobbers discount	63-5

Basing points, light rails—Pittsburgh, Chicago, Birmingham; spikes and tie plates—Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; tie plates alone—Steelton, Pa., Buffalo; spikes alone—Youngstown, Lebanon, Pa., Richmond.

ROOFING TERNE PLATE

(F.o.b. Pittsburgh, 112 Sheets)

	20x14 in.	20x28 in.
8-lb. coating I.C.	$6.00	$12.00
15-lb. coating I.C.	7.00	14.00
20-lb. coating I.C.	7.50	15.00

PRICES

ELECTRICAL SHEETS

(Base, f.o.b. Pittsburgh)

	Per Lb.
Field grade	3.20c.
Armature	3.55c.
Electrical	4.05c.
Motor	4.95c.
Dynamo	5.65c.
Transformer 72	6.15c.
Transformer 65	7.15c.
Transformer 58	7.65c.
Transformer 52	8.45c.

F.o.b. Granite City, add 10c. per 100 lb. on field grade to and including dynamo. Pacific ports add 75c. per 100 lb. on all grades.

WIRE PRODUCTS

To the trade, f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham

	Base per Keg
Standard wire nails	$2.55
Coated nails	2.55
Cutnails, carloads	3.85
	Base per 100 Lb.
Annealed fence wire	$3.05
Annealed galvanized fence wire	3.40
	Base Column
Woven wire fence*	67
Fence posts (carloads)	69
Single loop bale ties	59
Galvanized barbed wiret	70
Twisted barbless wire	70

*15½ gage and heavier. †On 80-rod spools in carload quantities.

WELDED PIPE AND TUBING

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

(F.o.b. Pittsburgh only on wrought pipe)
Base Price—$200 per Net Ton

Steel (Butt Weld)

	Black	Galv.
½ in.	63½	51
¾ in.	66½	55
1 to 3 in.	68½	57½

Wrought Iron (Butt Weld)

½ in.	25	3½
¾ in.	30	10
1 and 1¼ in.	34	16
1½ in.	38	18½
2 in.	37½	18

Steel (Lap Weld)

2 in.	61	49½
2½ and 3 in.	64	52½
3½ to 6 in.	66	54½

Wrought Iron (Lap Weld)

2 in.	30½	12
2½ to 3½ in.	31½	14½
4 in.	33½	18
4½ to 8 in.	32½	17

Steel (Butt, extra strong, plain ends)

	Black	Galv.
½ in.	61½	50½
¾ in.	65½	54½
1 to 3 in.	67	57

Wrought Iron (Same as Above)

½ in.	25	6
¾ in.	31	12
1 to 2 in.	38	19½

Steel (Lap, extra strong, plain ends)

2 in.	59	48½
2½ and 3 in.	63	52½
3½ to 6 in.	66½	56

Wrought Iron (Same as Above)

2 in.	33½	15½
2½ to 4 in.	39	22½
4½ to 6 in.	37½	21

On butt weld and lap weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card.

F.o.b. Gary prices are two points lower discount or $4 a ton higher than Pittsburgh or Lorain on lap weld and one point lower discount, or $2 a ton higher on all butt weld.

PIG IRON

All prices set in bold face type are maxima established by OPA on June 24, 1941. Other domestic prices (in italics) are delivered quotations per gross ton computed on the basis of the official maxima. Delivered prices do not reflect 3 per cent tax on freight rates.

	No. 2 Foundry	Basic	Bessemer	Malleable	Low Phosphorus	Charcoal
Boston††	*$25.50*	*$25.00*	*$26.50*	*$25.50*	.....	.....
Brooklyn	*27.50*	.....	.....	*28.00*	.....	.....
Jersey City	*26.53*	*26.03*	*27.53*	*27.03*	.....	.....
Philadelphia (5)	*25.84*	*25.34*	*26.84*	*26.34*	*$30.74*	.....
Bethlehem, Pa.	25.00	24.50	26.00	25.50	.....	.....
Everett, Mass. (3)	25.00	24.50	26.00	25.50	.....	.....
Swedeland, Pa.	25.00	24.50	26.00	25.50	.....	.....
Steelton, Pa.	.....	24.50	.....	.....	29.50	.....
Birdsboro, Pa. (4)	25.00	24.50	26.00	25.50	29.50	.....
Sparrows Point, Md.	25.00	24.50	.....	.....	.....	.....
Erie, Pa.	24.00	23.50	25.00	24.50	.....	.....
Neville Island, Pa.	24.00	23.50	24.50	24.00	.....	.....
Sharpsville, Pa. (1)	24.00	23.50	24.50	24.00	.....	.....
Buffalo	24.00	23.00	25.00	24.50	29.50	.....
Cincinnati, Ohio	*23.94*	*23.94*	.....	*25.11*	.....	.....
Canton, Ohio	*25.39*	*24.89*	*25.89*	*25.39*	*32.69*	.....
Mansfield, Ohio	*25.94*	*25.44*	*26.44*	*25.94*	*32.86*	.....
St. Louis	*24.50*	*24.50*	.....	.....	.....	.....
Chicago	24.00	23.50	24.50	24.00	*35.46*	.....
Granite City, Ill.	24.00	23.50	24.50	24.00	.....	.....
Cleveland	24.00	23.50	24.50	24.00	*32.42*	.....
Hamilton, Ohio	24.00	23.50	.....	24.00	.....	.....
Toledo	24.00	23.50	24.50	24.00	.....	.....
Youngstown*	24.00	23.50	24.50	24.00	*32.42*	.....
Detroit	24.00	23.50	24.50	24.00	.....	.....
Lake Superior fc.	.....	.....	.....	.....	.....	$34.00
Lyles, Tenn. fc.†(2)	.....	.....	.....	.....	.....	33.00
St. Paul	*26.76*	.....	*27.26*	*26.76*	*39.80*	.....
Duluth	24.50	24.00	25.00	24.50	.....	.....
Birmingham	20.38	19.00	25.00	.....	.....	.....
Los Angeles	*26.95*	.....	.....	.....	.....	.....
San Francisco	*26.95*	.....	.....	.....	.....	.....
Seattle	*26.95*	.....	.....	.....	.....	.....
Provo, Utah	[22.00	21.50	.....	.....	.....	.....
Montreal	*27.50*	*27.50*	.....	*28.00*	.....	.....
Toronto	*25.50*	*25.50*	.....	*26.00*	.....	.....

†GRAY FORGE IRON: Valley or Pittsburgh furnace $23.50

(1) Pittsburgh Coke & Iron Co. (Sharpsville, Pa., furnace only) and the Struthers Iron and Steel Co., Struthers, Ohio, may charge 50c. a ton in excess of basing point prices for No. 2 foundry, basic, bessemer and malleable.

(2) Price shown is for low-phosphorous iron; high-phosphorous sells for $28.50 at the furnace.

(3) Eastern Gas & Fuel Associates, Boston, is permitted to sell pig iron produced by its selling company, Mystic Iron Works, Everett, Mass., at $2 per gross ton above maximum prices.

(4) E. & G. Brooke Co. permitted to charge $1.00 per ton extra.

(5) Pittsburgh Ferromanganese Co. (Chester furnace only) may charge $2.25 a ton over maximum basing point prices

Basing point prices are subject to switching charges; silicon differentials (not to exceed 50c. a ton for each 0.25 per cent silicon content in excess of base grade which is 1.75 per cent to 2.25 per cent); phosphorous differentials, a reduction of 38c. per ton for phosphorous content of 0.70 per cent and over; manganese differentials, a charge not to exceed 50c. per ton for each 0.50 per cent manganese content in excess of 1.00 per cent. Effective March 3, 1943, $2 per ton extra may be charged for 0.5 to 0.75 per cent nickel content and $1 per ton extra for each additional 0.25 per cent nickel.

METAL POWDERS

Prices are based on current market prices of ingots plus a fixed figure. For ton lots f.o.b. shipping point, in cents per lb.

Copper, electrolytic, 150 and 200 mesh	21⅛ to 23⅛c
Copper, reduced, 150 and 200 mesh	20½ to 25⅛c
Iron, commercial, 100 and 200 mesh	13½ to 15c
Iron, crushed, 200 mesh and finer	40
Iron, hydrogen reduced, 300 mesh and finer	63c
Iron, electrolytic, unannealed, coarser than 300 mesh	30 to 33c
Iron, electrolytic, annealed minus 100 mesh	42c
Iron, carbonyl, 300 mesh and finer	90c
Aluminum, 100 and 200 mesh.	*23 to 27c
Antimony, 100 mesh	20.6c
Cadmium, 100 mesh	$1
Chromium, 150 mesh	$1.03
Lead, 100, 200 & 300 mesh.	11½ to 12½c
Manganese, 150 mesh	51c.
Nickel, 150 mesh	51½c.
Solder powder, 100 mesh,	8½c. plus metal
Tin, 100 mesh	58¾c

*Freight allowed east of Mississippi.

BOILER TUBES

Seamless Steel and Lap Weld Commercial Boiler Tubes and Locomotive Tubes Minimum Wall. Net base prices per 100 ft. f.o.b. Pittsburgh, in carload lots.

	Seamless Cold Drawn	Hot Rolled	Lap Weld Hot Rolled
1 in. o.d.	13 B.W.G. 15.03	13.04	12.33
2½ in. o.d.	12 B.W.G. 20.21	17.54	16.58
3 in. o.d.	12 B.W.G. 22.48	19.50	18.35
3½ in. o.d.	11 B.W.G. 28.37	24.62	23.15
4 in. o.d.	10 B.W.G. 35.20	30.54	28.66

(Extras for less carload quantities)

40,000 lb. or ft., and over	Base
30,000 lb. or ft. to 39,999 lb. or ft.	5%
20,000 lb. or ft. to 29,999 lb. or ft.	10%
10,000 lb. or ft. to 19,999 lb. or ft.	20%
5,000 lb. or ft. to 9,999 lb. or ft.	30%
2,000 lb. or ft. to 4,999 lb. or ft.	45%
Under 2,000 lb. or ft.	65%

SEMI-FINISHED STEEL

Billets, Blooms and Slabs

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point (rerolling only). Prices delivered Detroit are $2.00 higher; f.o.b. Duluth, billets only, $2.00 higher; billets f.o.b. Pacific ports are $12 higher. Delivered prices do not reflect new three per cent tax on freight rates.

	Per Gross Ton
Rerolling	$34.00
Forging quality	40.00

Connors Steel Co., Birmingham, may charge $50.69 for rerolling billets.

Alloy Steel

Pittsburgh, Chicago, Canton, Massillon, Buffalo, or Bethlehem, per gross ton $54.00

Shell Steel

	Per Gross Ton
3 in. to 12 in.	$52.00
12 in. to 18 in.	54.00
18 in. and over	56.00

Basic open hearth shell steel, f.o.b. Pittsburgh, **Chicago, Buffalo**, Gary, Cleveland, Youngstown and Birmingham.

Prices delivered Detroit are $2.00 higher.

Note: The above base prices apply on lots of 1000 tons of a size and section to which are to be added extras for chemical requirements, cutting, or quantity.

Sheet Bars

Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.

	Per Gross Ton
Open hearth or bessemer	$34.00

Skelp

Pittsburgh, **Chicago**, Youngstown, Coatesville, Pa., Sparrows Point, Md.

	Per Lb.
Grooved, universal and sheared	1.90c.

Wire Rods

(No. 5 to 9/32 in.)

	Per Lb.
Pittsburgh, Chicago, Cleveland	2.00c.
Worcester, Mass.	2.10c.
Birmingham	2.00c.
San Francisco	2.50c.
Galveston	2.25c.

9/32 in. to 47/64 in., 0.15c. a lb. higher. Quantity extras apply.

TOOL STEEL

(F.o.b. Pittsburgh, Bethlehem, Syracuse)

	Base per lb.
High speed	67c.
Straight molybdenum	54c.
Tungsten-molybdenum	57½c.
High-carbon-chromium	43c.
Oil hardening	24c.
Special carbon	22c.
Extra carbon	18c.
Regular carbon	14c.

Warehouse prices east of Mississippi are 2c. a lb. higher; west of Mississippi 3c. higher.

CORROSION AND HEAT-RESISTING STEEL

(Per lb. base price, f.o.b. Pittsburgh)

Chromium-Nickel Alloys

	No. 304	No. 302
Forging billets	21.25c.	20.40c.
Bars	25.00c.	24.00c.
Plates	29.00c.	27.00c.
Structural shapes	25.00c.	24.00c.
Sheets	36.00c.	34.00c.
Hot rolled strip	23.50c.	21.50c.
Cold rolled strip	30.00c.	28.00c.
Drawn wire	25.00c.	24.00c.

Straight-Chromium Alloys

	No. 410	No. 430	No. 442	No. 446
F.Billets	15.725c.	16.15c.	19.125c.	23.375c.
Bars	18.50c.	19.00c.	22.50c.	27.50c.
Plates	21.50c.	22.00c.	25.50c.	30.50c.
Sheets	26.50c.	29.00c.	32.50c.	36.50c.
Hot strip	17.00c.	17.50c.	24.00c.	35.00c.
Cold strip	22.00c.	22.50c.	32.00c.	52.00c.

Chromium-Nickel Clad Steel (20%)

	No. 304
Plates	18.00c.*
Sheets	19.00c.

*Includes annealing and pickling.

PRICES

Ferromanganese

78-82% manganese, maximum contract base price per gross ton, lump size, f.o.b. car at Baltimore, Philadelphia, New York, Birmingham, Rockdale, Rockwood, Tenn.

Carload lots (bulk)	$135.00
Ton lots (packed)	141.00
Less ton lots (packed)	148.50

Premium, $1.70 for each 1% above 82% Mn; penalty, $1.70 for each 1% below 78%.

Electrolytic Manganese

99.9% manganese, maximum base contract price per lb. of metal, bulk, f.o.b. shipping point, with freight allowed to destination. Size, 1" x D.

	Eastern Zone	Central Zone	Western Zone
Carload lots	37.60c.	37.85c.	38.15c.
l.c.l. lots	39.60c.	38.60c.	40.65c.

Spiegeleisen

Maximum base contract prices, per gross ton, lump, f.o.b. Palmerton, Pa.

	16-19% Mn 1% max. Si	19-21% Mn 1% max. Si	26-28% Mn 1% max. Si
Carloads	$35.00	$36.00	$49.50
Less ton*	47.50	48.50	62.00

Electric Ferrosilicon

OPA maximum base price cents per lb contained Si, lump size in carlots, f.o.b. shipping point with freight allowed to destination.

	Eastern Zone	Central Zone	Western Zone
50% silicon	6.65c.	7.10c.	7.25c.
75% silicon	8.05c.	8.20c.	8.75c.

Spot sales 45c. per lb. higher for 50% Si; 30c. for 75% Si. For extras and premiums see MPR 405.

Silvery Iron

(*Per Gross Ton, base 6.00 to 6.50 Si*)

F.o.b. Jackson, Ohio	$29.50*
Buffalo	30.75*

For each additional 0.50% silicon add $1 a ton. For each 0.50% manganese over 1% add 50c. a ton. Add $1 a ton for 0.75% phosphorus or over.

*Official OPA price established June 24, 1941.

Bessemer Ferrosilicon

Prices are $1 a ton above silvery iron quotations of comparable analysis.

Silicon Metal

OPA maximum base price per lb. of contained Si, lump size, f.o.b. shipping point with freight allowed to destination for l.c.l. above 2000 lb., packed.

	Eastern Zone	Central Zone	Western Zone
96% Si, 2% Fe.	13.10c.	13.55c.	16.50c.
97% Si, 1% Fe.	13.45c.	13.90c.	16.80c.

Ferrosilicon Briquets

OPA maximum base price per lb. of briquet, bulk, f.o.b. shipping point with freight allowed to destination. Approximately 40% silicon.

	Eastern Zone	Central Zone	Western Zone
Car lots	3.35c.	3.50c.	3.65c.

Spot prices ¼c. higher per lb. of briquet. For premiums and extras see MPR 405.

Silicomanganese

(*Per gross ton, delivered, carloads, bulk*)

3.00 carbon	$120.00*
2.50 carbon	125.00*
2.00 carbon	130.00*
1.00 carbon	140.00*
Briquets, contract, basis carlots, bulk freight allowed, per lb.	5.80c.†
Packed	6.05c.†
Less ton lots	6.55c.†

*Spot prices are $5 per ton higher.
†Spot prices ¼c. higher.

Ferrochrome

(65-72% *Cr*, 2% *max. Si*)

OPA maximum base contract prices per lb. of contained Cr, lump size in carlots, f.o.b. shipping point, freight allowed to destination.

	Eastern Zone	Central Zone	Western Zone
0.03% carbon	25.00c.	25.40c.	26.00c.
0.06% carbon	23.00c.	23.40c.	24.00c.
0.10% carbon	22.50c.	22.90c.	23.50c.
1.00% carbon	20.50c.	20.90c.	21.50c.
2.00% carbon	19.50c.	19.90c.	20.50c.

Spot prices are ¼c. higher per lb. contained Cr. For extras and premiums see MPR 407.

Other Ferroalloys

Ferrotungsten, delivered, carlots, per lb. contained tungsten	$1.90
Tungsten metal powder, 98%-99%, any quantity, per lb.	$2.60
Ferrovanadium, 35%-40%, contract basis, f.o.b. producers plant, usual freight allowances, open-hearth grades, per lb. contained vanadium	$2.70
Special grade	$2.80
Very special grade	$2.90
Vanadium pentoxide, 88%-92% V_2O_5 technical grade, contract basis, any quantity, per lb. contained V_2O_5	$1.10
Ferroboron, contract basis, 17.50% boron minimum, f.o.b. Niagara Falls, carlots, per lb. alloy	$1.20
Ton lots	$1.25
Silcaz No. 3, contract basis, f.o.b. Niagara Falls, all quantities, per lb. of alloy	23c.
Silvaz No. 3, contract basis, f.o.b. Niagara Falls, all quantities, per lb. of alloy	40c.
Grainal, f.o.b. Bridgeville, Pa., freight allowed 100 lb. and over, maximum based on rate to St. Louis, per lb.	45c.
Bortam, f.o.b. Niagara Falls	
Ton lots, per lb.	45c.
Less ton lots, per lb.	50c.
Borosil, 3% to 4% boron, 40 to 45% silicon, f.o.b. Philo, Ohio, per lb. contained boron	$7.00
Ferrocolumbium, 50% to 60%, f.o.b. Niagara Falls, ton lots, per lb. contained columbium	$2.25
Less ton lots	$2.30
Ferrotitanium, 40%-45%, f.o.b. Niagara Falls, N. Y., ton lots, per lb. contained titanium	$1.23
Less ton lots	$1.25
Ferrotitanium, 20%-25%, 0.10 C max., ton lots, per lb. contained titanium	$1.35
Less ton lots	$1.40
High-carbon ferrotitanium, 15%-20%, 6%-8% carbon, contract basis, f.o.b. Niagara Falls, N. Y., freight allowed East of Mississippi River, North of Baltimore and St. Louis, per gross ton	$142.50
3%-5% carbon	$157.50
Ferrophosphorus, 18% electric or blast furnace, f.o.b. Anniston, Ala., carlots, with $3 unitage freight equaled with Rockdale, Tenn., per gross ton	$58.50
Ferrophosphorus, electrolytic 23-26%, carlots, f.o.b. Monsanto (Siglo), Tenn., $3 unitage freight equalized with Nashville, per gross ton	$75.00
Ferromolybdenum, 55-75% f.o.b. Langeloth and Washington, Pa., any quantity, per lb. contained molybdenum	95c.
Calcium molybdate, 40%-45%, contract basis, f.o.b. Langeloth and Washington, Pa., any quantity, per lb. contained molybdenum	80c.
Molybdenum oxide briquettes, 48%-52% Mo, f.o.b. Langeloth, Pa., per lb. contained Mo	80c.
Molybdenum oxide, in cans, f.o.b. Langeloth and Washington, Pa., per lb. contained Mo	80c.
Molybdenum powder, 99%, in 200-lb. kegs, f.o.b. York, Pa., per lb.	$2.60
Under 100 lb.	$3.00
Zirconium, 35-40%, contract basis, carloads in bulk or package, per lb. of alloy	15c.
Less ton lots	16c.
Zirconium, 12-15%, contract basis, carlots, bulk, per gross ton	$102.50
Packed	$107.50
Less ton lots	$112.50
Alsifer (approx. 20% Al, 40% Si and 40% Fe), contract basis, f.o.b. Niagara Falls, per lb.	7.50c.
Ton lots	8c.
Simanal (approx. 20% Si, 20% Mn, 20% Al), contract basis, f.o.b. Philo, Ohio, with freight not to exceed St. Louis rate allowed, per lb.	
Car lots	9.50c.
Ton lots	10.00c.
Less ton lots	10.50c.

Six years without major repairs with Armstrong's Insulating Fire Brick

This Story of Four Powdered Coal Fired Furnaces May Suggest the Solution for Your Refractory Problem

ARMSTRONG'S Insulating Fire Brick were used directly exposed in coal-fired pot annealing furnaces built six years ago at the Walworth Company's plant in Greensburg, Pennsylvania. Today those same brick are giving "very satisfactory" service, according to a Walworth official, and have required only routine factory maintenance since installation.

This record is noteworthy because the insulating refractories had to withstand the abrasive action of powdered coal fuel. Moreover, at one time during the six-year period a flash flood inundated the department and caught the furnaces hot.

Specifications for these furnaces were: walls—9″ of Armstrong's A-23 backed up with 4½″ of Armstrong's A-16 Insulating Fire Brick; arch —9″ of Armstrong's A-26 Insulating Fire Brick backed up with 2½″ of insulating block; hearth—7″ of insulating brick with 4″ of paving brick on top; facing—entire inside exposed surface given two coats of Armstrong's Air Set Cement and, after five heats, a third coat.

All five types of Armstrong's Insulating Fire Brick (for temperatures from 1600° to 2600° F.) are available, and all have the requirements for complete efficiency: high physical strength (hot and cold), low thermal conductivity, resistance to spalling, low heat storage, uniformity, and light weight.

For full information about lightweight refractories, write us today. Armstrong engineers, with a background of 29 years' experience in this field, will be glad to help you select the right brick, cement, and method of application. Address Armstrong Cork Company, Insulating Refractories Department, 4911 Arch St., Lancaster, Pennsylvania.

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